

Edition April 1971

Dual 1218 Service Manual



Technical data

Power source:

alternating current, 50 or 60 Hz, depending on choice of interchangeable motor pulley

Supply voltage:

110, 117 or 220 volts, switchable

Drive system:

4-pole, split-pole synchronous motor with radially located elastic mounts. Transmission to turntable platter via highly wear-resistant, compliant idler wheel

Power consumption:

10 watts approx.

Current consumption:

at 220 volts, 50 Hz, approx. 64 mA

at 117 volts, 60 Hz, approx. 115 mA

Turntable platter:

non-magnetic, 1.8 kg (4 lb), 270 mm (10.5 in.) diameter

Moment of inertia: $1.9 \cdot 10^{-5}$ gram cm/sec

Turntable speeds:

33 1/3, 45 and 78 rpm

Pitch adjustment range:

6 % on all three speeds (approx. 1 musical semitone)

Speed variation:

± 0.09 % according to DIN 45 507

Rumble and other noise:

unweighted, ≤ 40 dB
weighted, ≤ 57 dB

according to DIN 45 500

Tonearm:

torsionally rigid metal arm, in 4-point gimbal suspension, with skeletal head design

Cartridge holder:

removable accepts all types of cartridges weighting between 1 and 12 grams and having internationally standard 1/2" mounting centers

Maximum tracking error:

$\leq 0.18^\circ$ /cm

Weight:

4.9 kg (10 3/4 lb) less packing

Mounting dimensions and mounting-board cut-out:

obtainable from mounting instructions

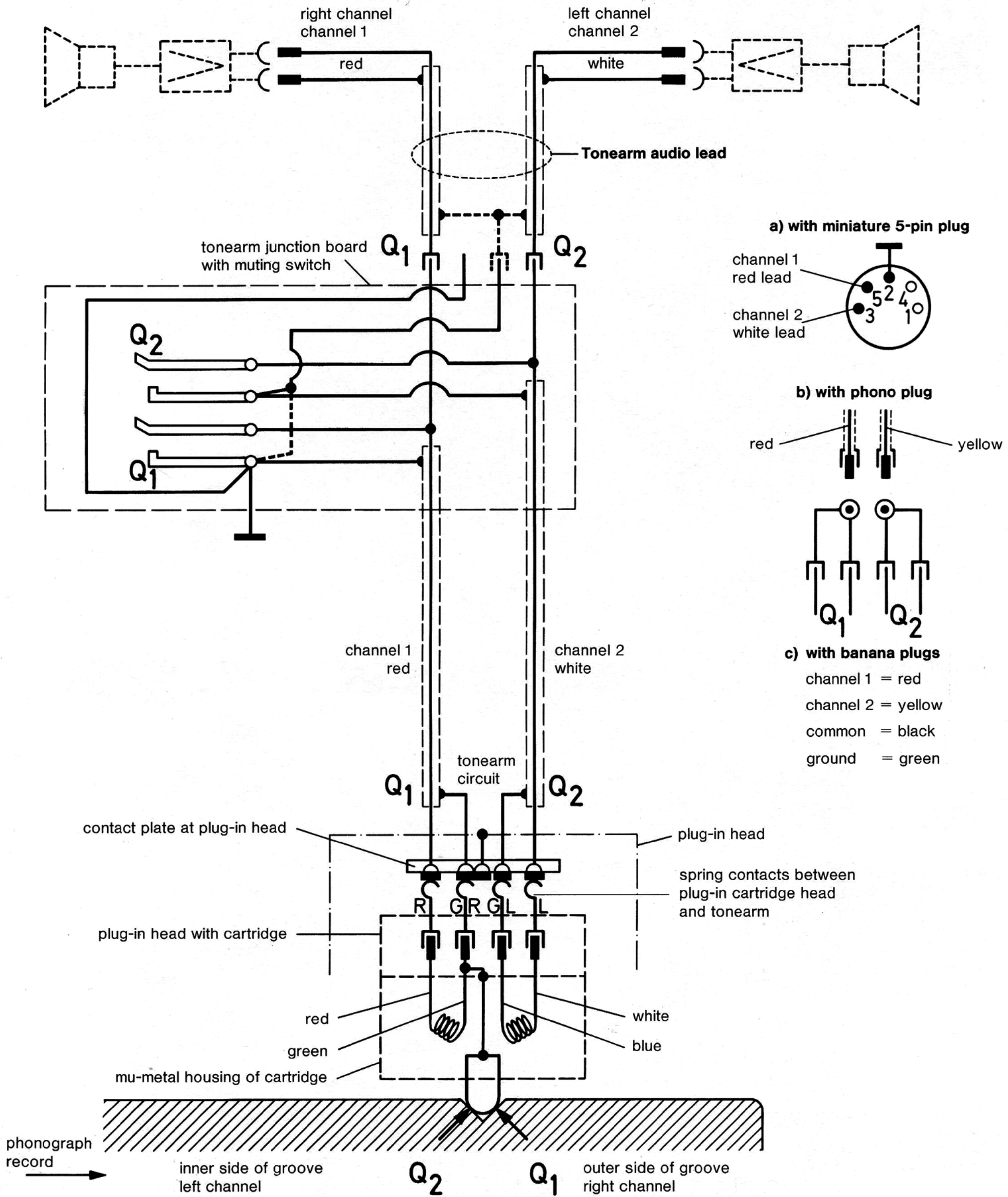
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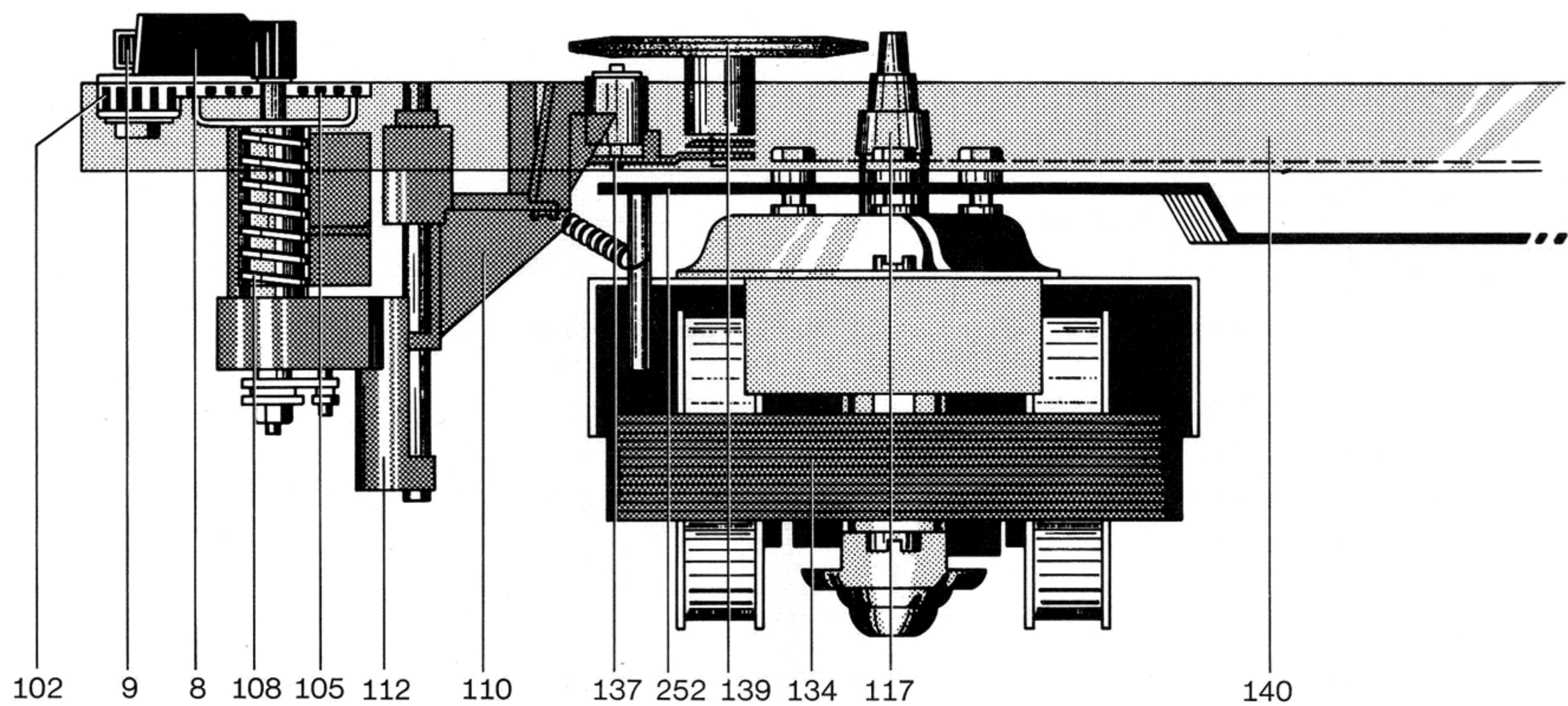
Fig. 1 Tonearm hookup schematic



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Fig. 2 Motor suspension and turntable drive



Motor and drive

Power for the turntable platter and the changing mechanism is supplied by a four-pole, split-pole synchronous motor suspended by radially located elastic mounts and having a very small stray magnetic field as well as little vibration. The speed of the motor is independent of line-voltage, temperature or load variations. Speed is dependent on, and proportional to, power-line frequency. The motor is adapted to 50 or 60 cycle (Hz) power-line frequencies by the correct choice of the motor pulley.

Motor pulley for 50 Hz operation:
part no. 218 273
Motor pulley for 60 Hz operation:
part no. 218 274

The motor pulley is fastened to the motor shaft by a setscrew. When you change pulleys, be sure that the new pulley is set at the correct height (see page 5). The turntable platter is driven by the idler wheel (139) which, to prevent damage to its friction surfaces, is automatically disengaged when the unit is shut off. Setting the turntable speed to 33 1/3, 45 or 78 rpm is done by raising or lowering the idler to bear against the proper step of the motor pulley. Upon actuation of the switch (8), the switch segment (107) rotates. This causes the lever (110) fitted into a slot on the segment to move vertically. The drive wheel (139) carried on the swinging arm (137) is then lifted off the motor pulley and moved and replaced on the motor pulley step corresponding to the selected speed.

Fig. 3 Motor field connections (with voltage selector)

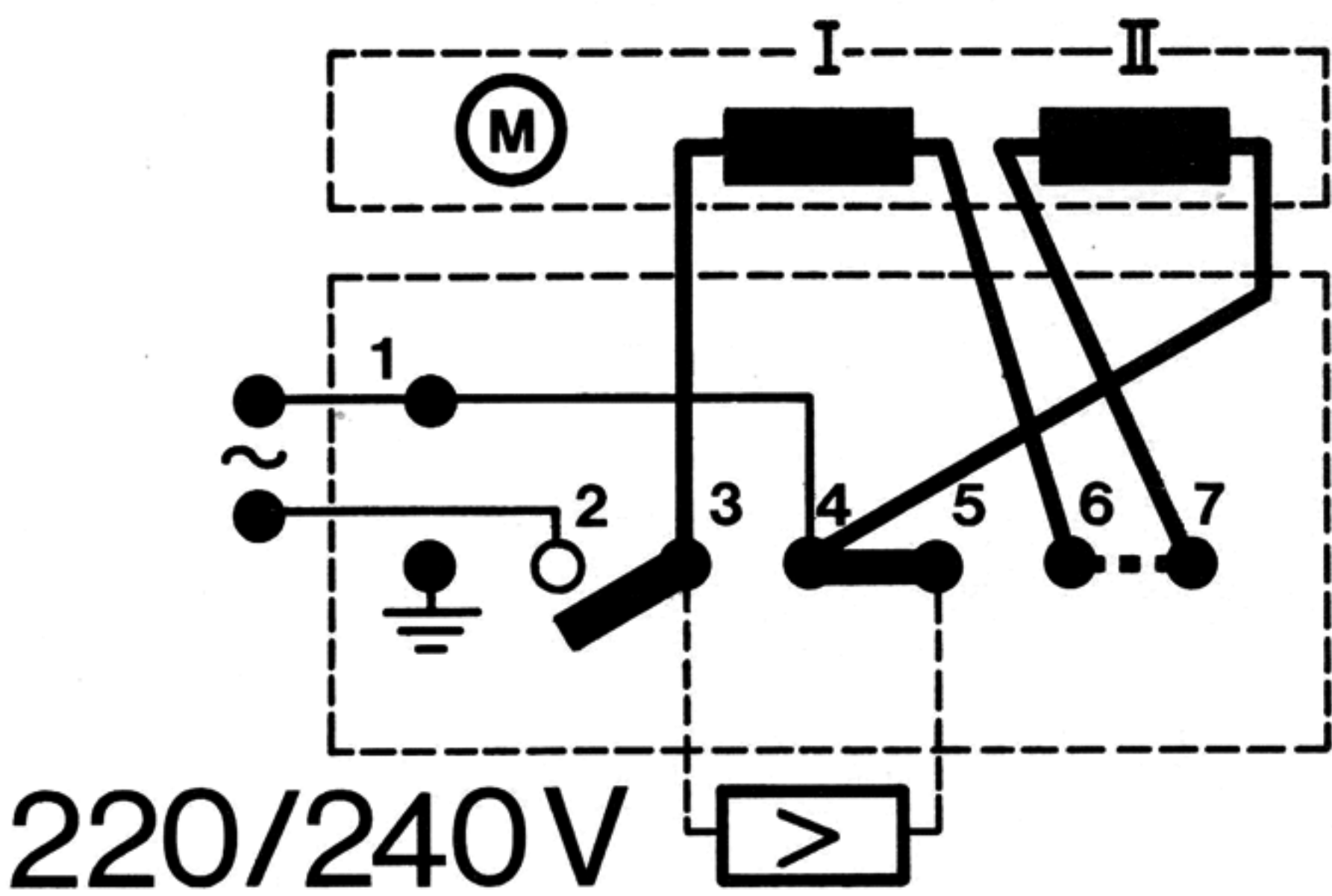
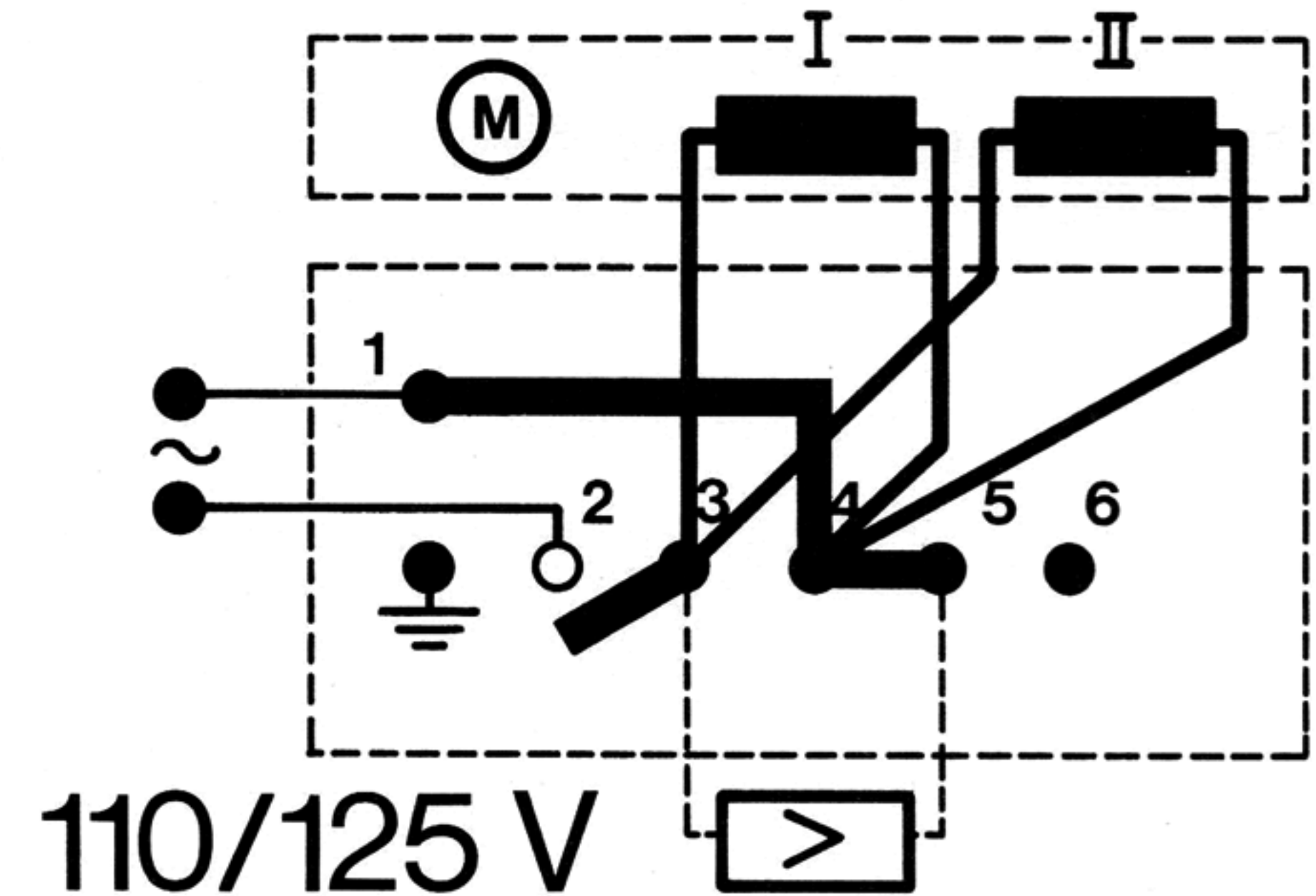


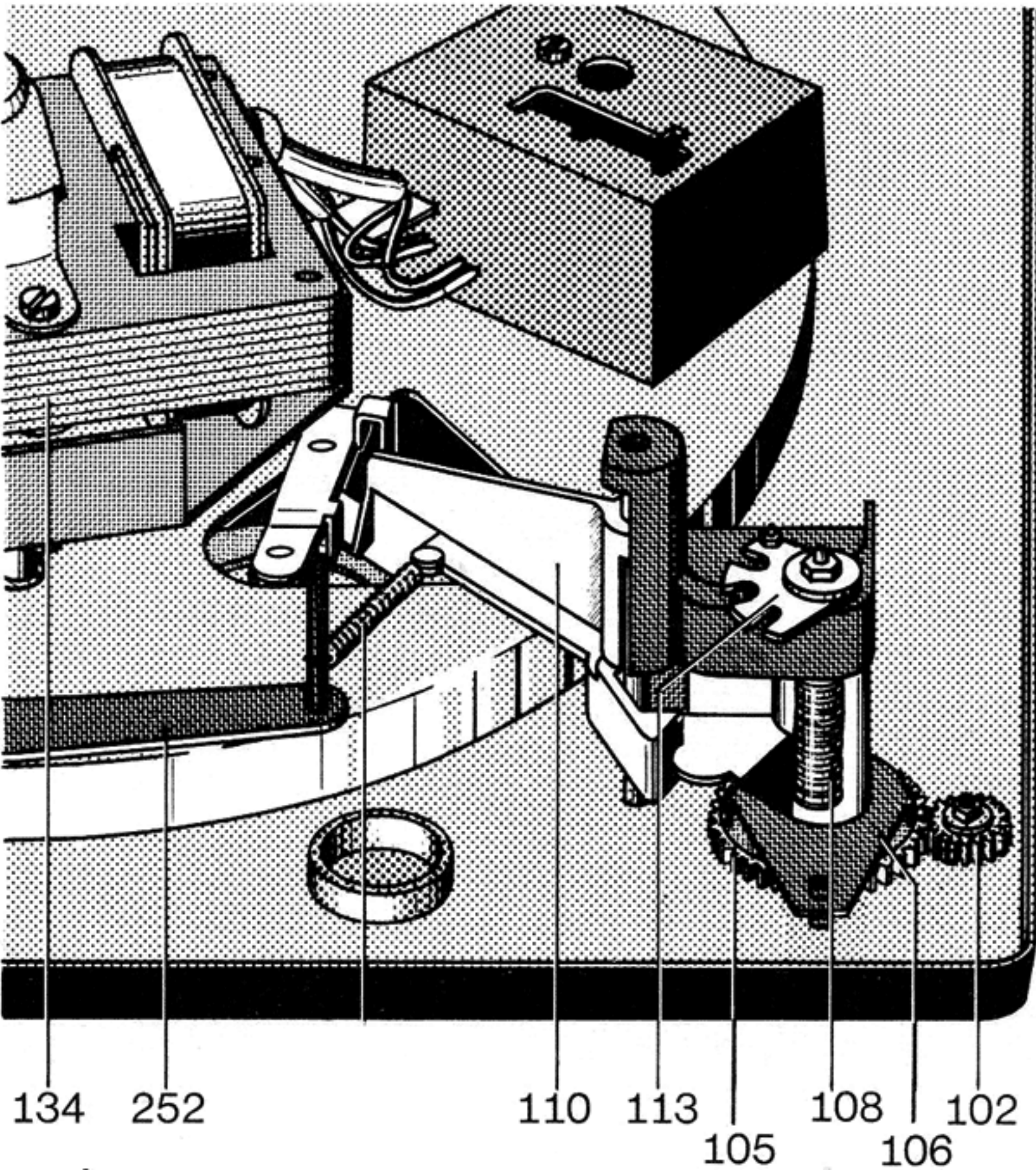
Fig. 4 Motor field connections (less voltage selector)



Fine-speed adjustment

A fine speed adjustment for all three speeds permits a platterspeed variation of 6 % (about 1 semitone). Turning the pitch-control knob (9) causes the selector segment (107) to rotate. The switch lever assembly (110) moves up and down, changing the position of the idler wheel on whatever motorpulley step it has been placed on. The tapered shape of the motor pulley gives an adjustment range of $\pm 3 \%$ from the nominal speed.

Fig. 5 Turntable speeds and drive wheel shift mechanism



Symptom	Cause	Remedy
Turntable does not run when unit is plugged in and start switch operated	a) Current path to motor interrupted b) Idler wheel (139) not in contact with platter c) Motor pulley loose	a) Check connection at switch plate and voltage selector b) Check switch lever assembly (110) c) Tighten motor pulley
Turntable does not come up to speed	a) Motor pulley is not correct for local line frequency b) Slippage between idler wheel (139) and motor pulley or platter c) Excessive friction in motor, drive wheel or platter bearings	a) Change motor pulley b) Clean friction surfaces of idler wheel, motor pulley and turntable platter. If necessary, replace drive wheel. Once the drive surface of the platter has been cleaned, do not touch it with your fingers. c) Clean and oil bearings
Rumble in reproduction	Worn idler wheel	Replace idler wheel (139) and clean platter drive surface and motor pulley with greaseless solvent. Once surfaces are cleaned, do not touch them with your fingers.

Symptom

Correct nominal speed obtained only at extreme settings of pitch control

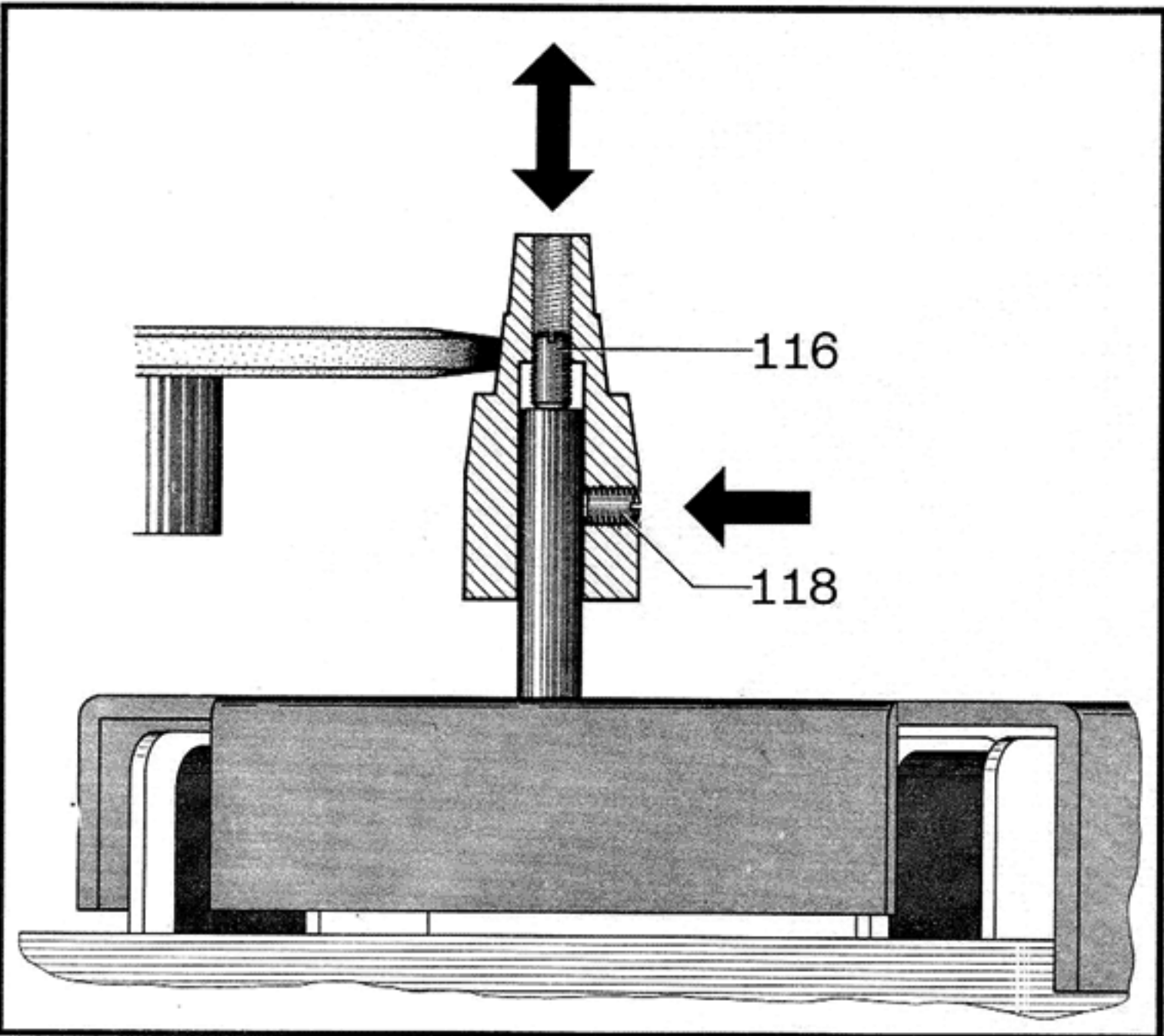
Cause

Idler wheel does not contact motor pulley correctly

Remedy

Adjust the motor pulley vertically after loosening its setscrew (116). Or adjust the idler wheel (139) by turning its shaft after loosening the locknut. The correct position for the idler is in the center of each motor pulley step, when the pitch control is centered in its range. Retighten locknut after adjustments.

Fig. 6 Motor pulley position



Tonearm and tonearm bearing

The Dual 1218 has a light, torsionally rigid metal tonearm in a gimbaltype suspension. The actual support is provided by four hardened and precision-polished steel points resting in precision ball bearings. Tonearm pivot friction is thus reduced to a minimum.

Vertical pivot friction 0.01 gram
Horizontal pivot friction 0.02 gram
referred to stylus tip

It therefore guarantees exceptionally good tracking characteristics. The tonearm head is removable. Before setting the correct stylus force for the particular cartridge installed in the tonearm head, the tonearm should be balanced with the stylus force setting dial at the zero position. Coarse balancing is accomplished by sliding the counterweight (50) and using setscrew (51), after which a fine adjustment is made by turning the weight. The counterweight is proportioned so that cartridges with a weight of from 1 to 12 grams can be balanced. For the absorption of vibration and rapid small shocks, the counterweight is coupled to its threaded shaft through an

Fig. 7 Tonearm bearing assembly

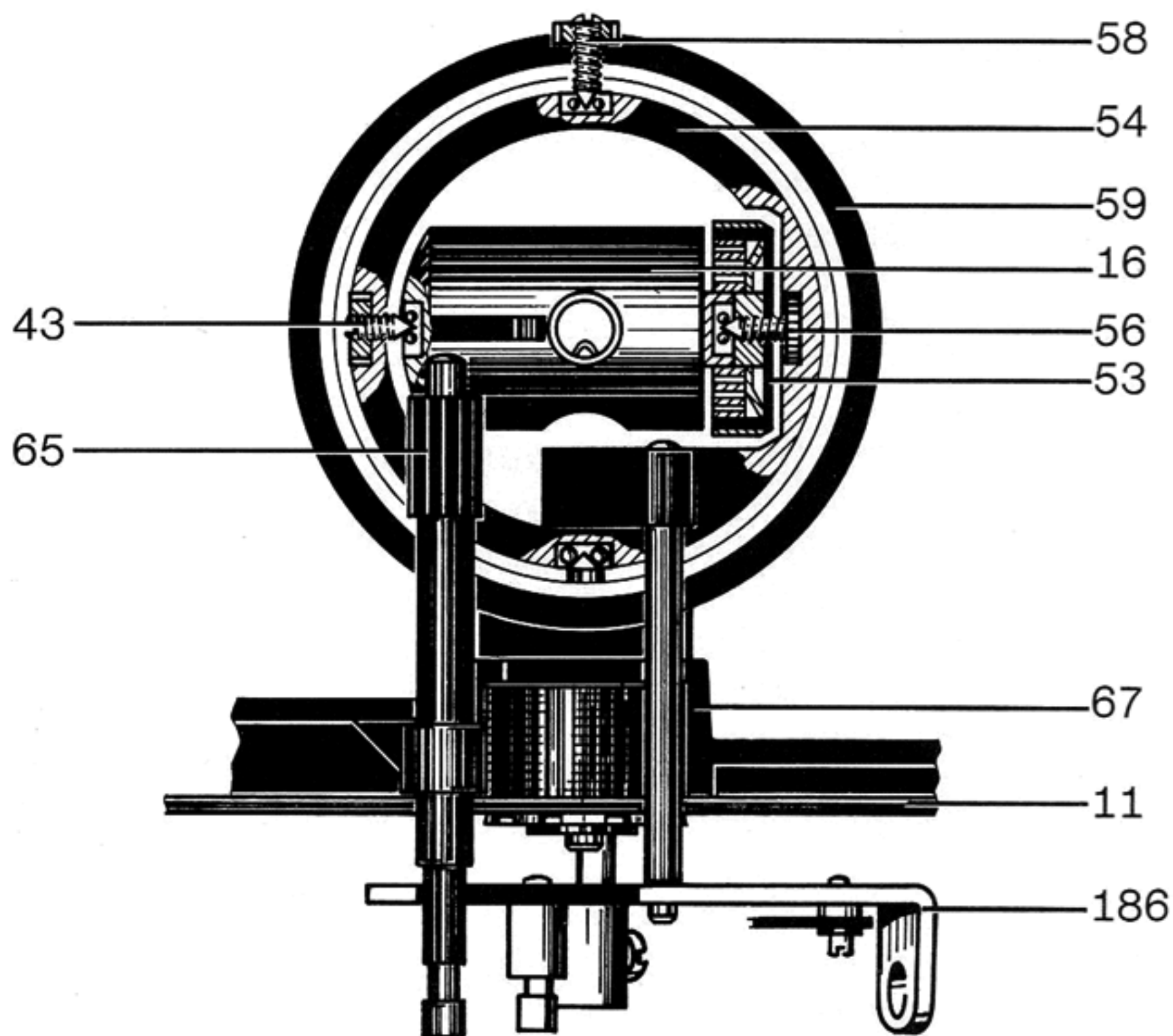
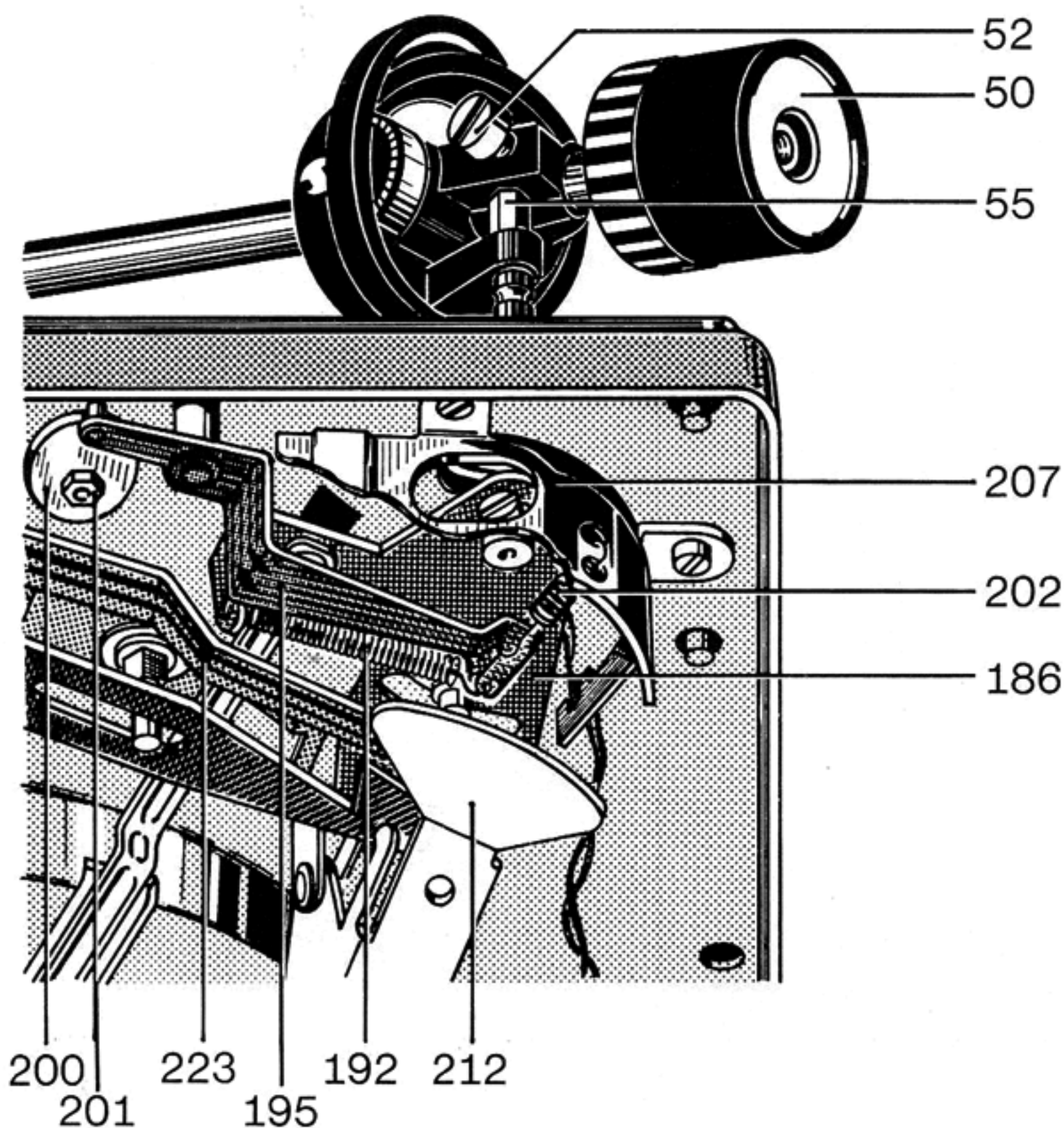


Fig. 8 Tonearm bearing assembly (under view)



elastic medium, and braked to prevent unintended rotation. The tonearm head accommodates all cartridges that conform to the internationally standard 1/2 inch mounting centers, and whose weight does not exceed 12 grams. Stylus force is set by turning spring housing (53), which is equipped with calibrations and which stresses or relaxes a spiral spring inside it. The scale is calibrated for a range of zero to 5.5 grams, and permits exact settings every 0.25 gram within that range.

To replace to tonearm complete with tonearm bearing, the following procedure is recommended:

1. Fasten complete unit in repair jig. Set stylus force to zero and lock tonearm.
2. Turn unit upside down and unsolder tonearm leads.
3. Remove main lever (212) and linking lever (223).
4. Unhook tension springs and unscrew protective cover.
5. Unfasten C-washer (196) and remove skating lever.
6. After loosening C-washer (247) and friction washer (246) separate shutoff slide (248) from segment (186).
7. Loosen cylinder screw (197) and remove segment (196).
8. Take off C-washer (62), underlying washer (61), and curved safety washer (60) or safety spring, and remove tonearm.

When replacing the tonearm and bearing assembly, follow the procedure in reverse. The unit is first in the upright position. Insert the tonearm and lock it. Turn unit upside down, and insert curved safety washer (60), underlying washer (61) and C-washer (62), or safety spring. When reinstalling the protective cover (207), be sure that the segment (186) can move without hindrance though the tonearm leads.

To remove the tonearm from the bearing ring, after unsoldering the tonearm leads set the stylus force dial to zero. Unscrew locknut (42) with threaded rod (43) and bearing screw (56) (left-hand thread). Take tonearm carefully out of the bearing ring. For adjusting the tonearm head, a hole is provided in the chassis to make this possible without first removing the tonearm.

Both bearings afford a small, barely noticeable play. Adjustment of the vertical bearing should be undertaken only at the left screw (threaded rod 43), and of the horizontal bearing at threaded rod (58). The horizontal tonearm bearing is correctly set when, at an antiskating setting of "0.5" (tonearm previously exactly balanced), the tonearm glides smoothly from inside (center) to outside without binding.

Anti-skating adjustment

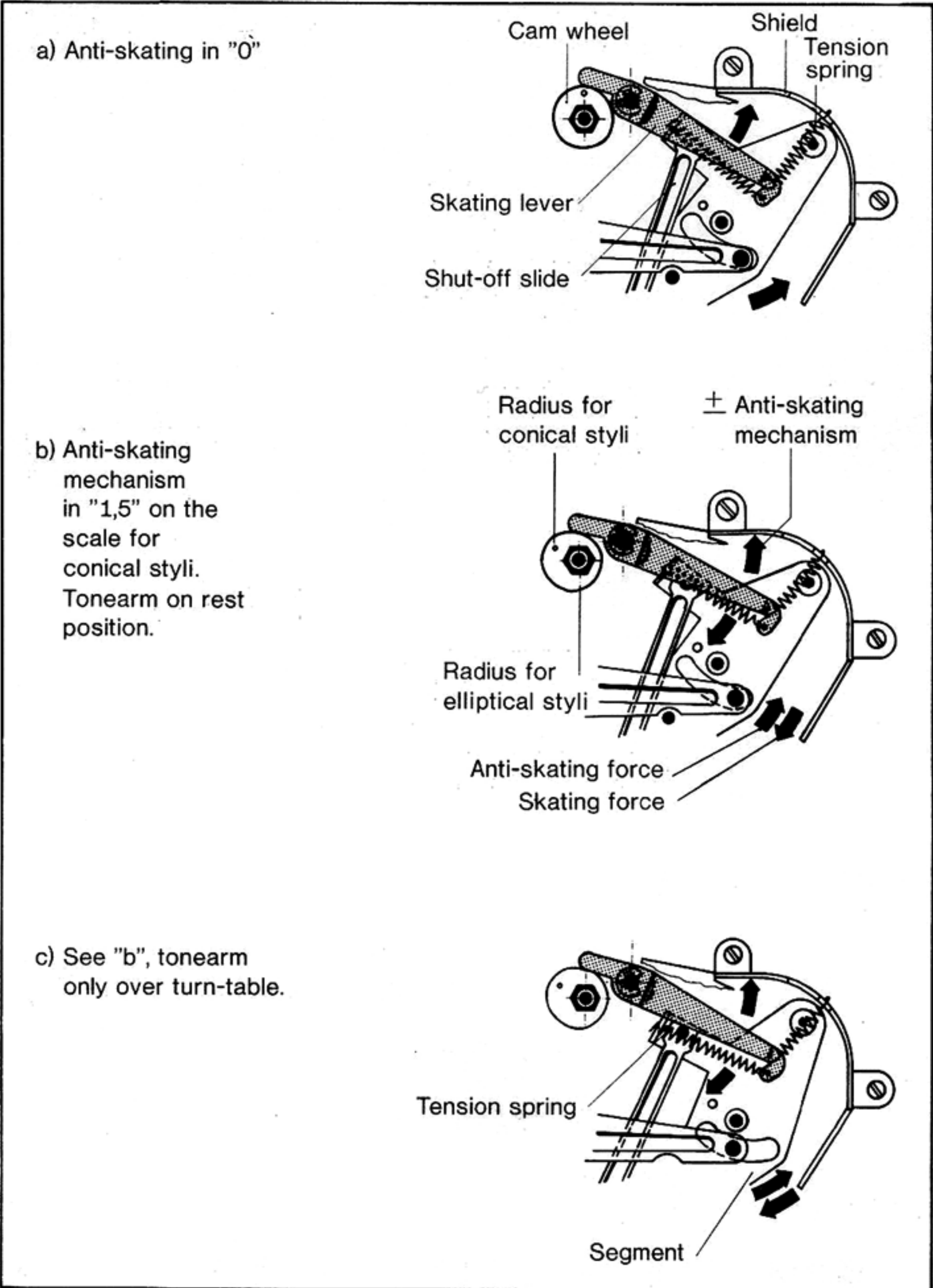
The tendency of a tonearm with an offset (angled) head to "skate" inward across the record is eliminated in the Dual 1218 by a precision anti-skating mechanism.

Skating force depends on tonearm geometry, stylus force and the tip radius of the stylus. The inward pull on the tonearm caused by the skating effect gives rise not only to an undesirable jumping of the tonearm when it is set down on the record, but also to unequal forces on the two opposite groove walls, with corresponding ill effects. This can be corrected with proper anti-skating adjustment.

By turning the anti-skating adjustment knob (66) on the chassis, an asymmetrical curved washer (200) is turned. This washer has two different curved surfaces corresponding, respectively, to the red and black scales on the anti-skating dial. The red scale is for conical (spherical-tip) styli; the black for elliptical (bi-radial) styli. When the knob is turned, the curved surfaces push the anti-skating lever (195) away from its rest position so that it applies a suitable counterforce via a spring (192).

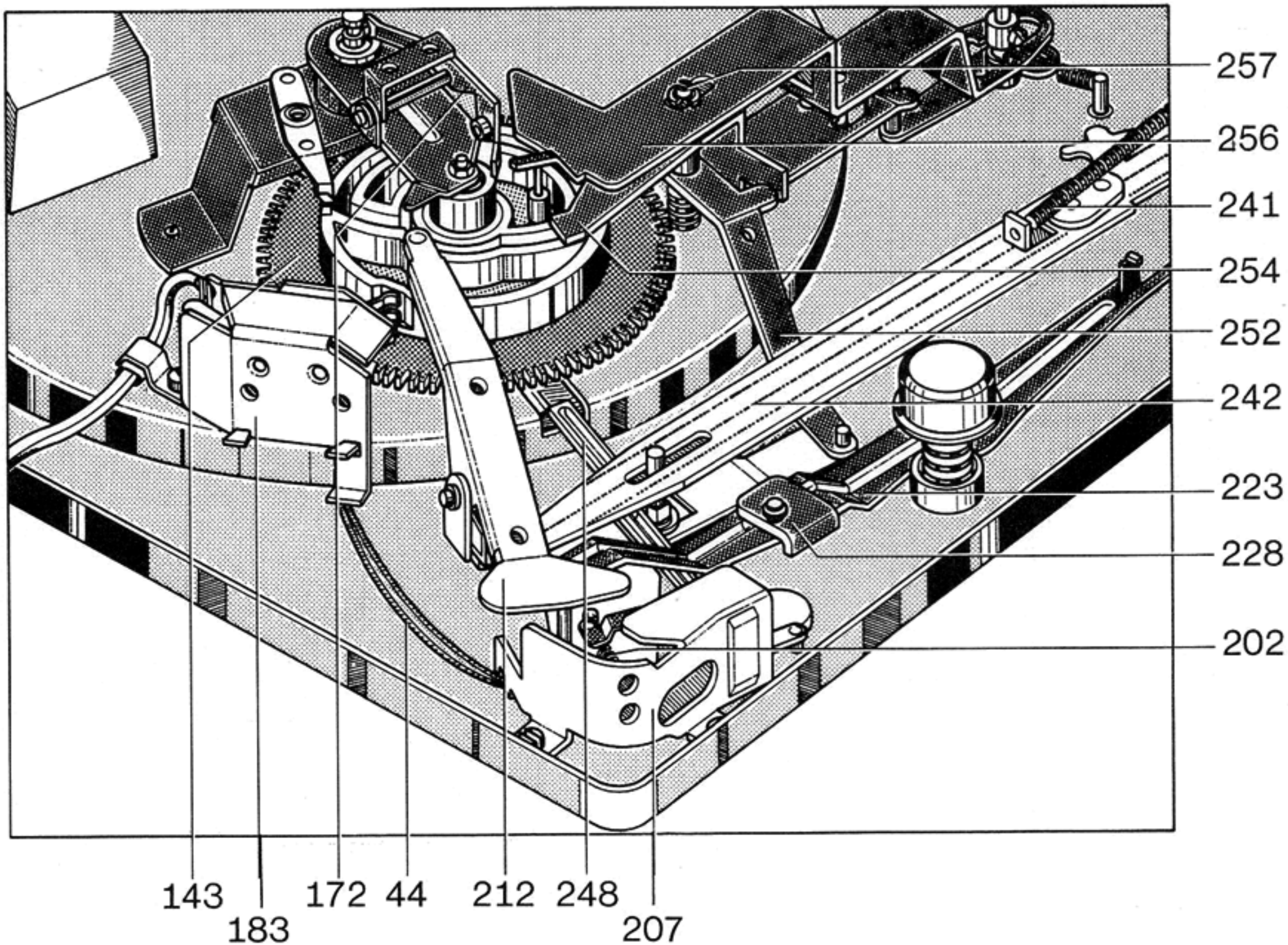
Skating compensation is set at the factory for conical styli with a tip radius of 0.6 to 0.7 mil (.0006 - .0007 inch), and for elliptical styli with measurements of 0.20 to 0.23 mil by 0.79 to 0.87 mil. The hex adjusting nut is tightened and sealed. Readjustments should be attempted only with the help of the Dual Skate-o-meter and test record L 096. This work is best done by an authorized Dual service agency.

Fig. 9 Anti-skating



Symptom	Cause	Remedy
Stylus skips	a) Tonearm not balanced	a) Balance tonearm
	b) Stylus force too low	b) Check tonearm balance, set stylus force to value recommended by cartridge manufacturer
	c) Anti-skating wrongly adjusted	c) Correct antiskating setting
	d) Stylus worn or chipped	d) Replace stylus
	e) Excessive friction in tonearm bearing	e) Check tonearm pivot. Should have barely noticeable play. Adjust vertical bearing only with the left bearing screw (43) and the horizontal bearing with nut (58). Horizontal bearing is correctly adjusted when the tonearm, with anti-skating set at 0.5 gram, swings freely from center to rest.
	f) Ball (249) missing from shut-off rail	f) Replace ball (249)
Vertical movement of tonearm is impeded during set-down cycle	a) Bearing friction too high	a) Check bearing screw (43) and arm balance
	b) Lift bolt (193) jams in guide tube (or sleeve).	b) To remove tonearm complete with bearing assembly (described on page 6). Remove pimpel (63) on lift bolt (193), remove C-washer (64) and positioning socket, and second C-washer (49). Lift out lift bolt. Clean lift guide tube and lift bolt. Coat lift bolt uniformly with "Wacker Silicon Oil AK 300 000".

Fig. 10 Tonearm guide mechanism



Tonearm movements

A guide groove located on the underside of the main cam (143) controls the automatic lift and set-down of the tonearm as the cam rotates through 360°. Tonearm lift and lowering are controlled

by the main lever (212) and the lift screw (193). Horizontal movements are controlled by the main lever (212) and the segment (186). Setting the changer for playback of 7", 10" or 12" discs is done with the indexing lever (46). Setdown points are determined by the eccentric portion of the arm positioning slide (242) and the indexing lever (240).

Horizontal movement of the tonearm is limited by the arm segment striking the arm positioning slide (242). During the change cycle, the main lever (212) raises the arm positioning slide, bringing it within reach of the spring stud. On completion of the change cycle (set-down of the tonearm on the record), the arm positioning slide (242) is again released and returns to its normal position. It thus moves out of reach of the spring stud, permitting the tonearm to move horizontally without hindrance, while playing the record.

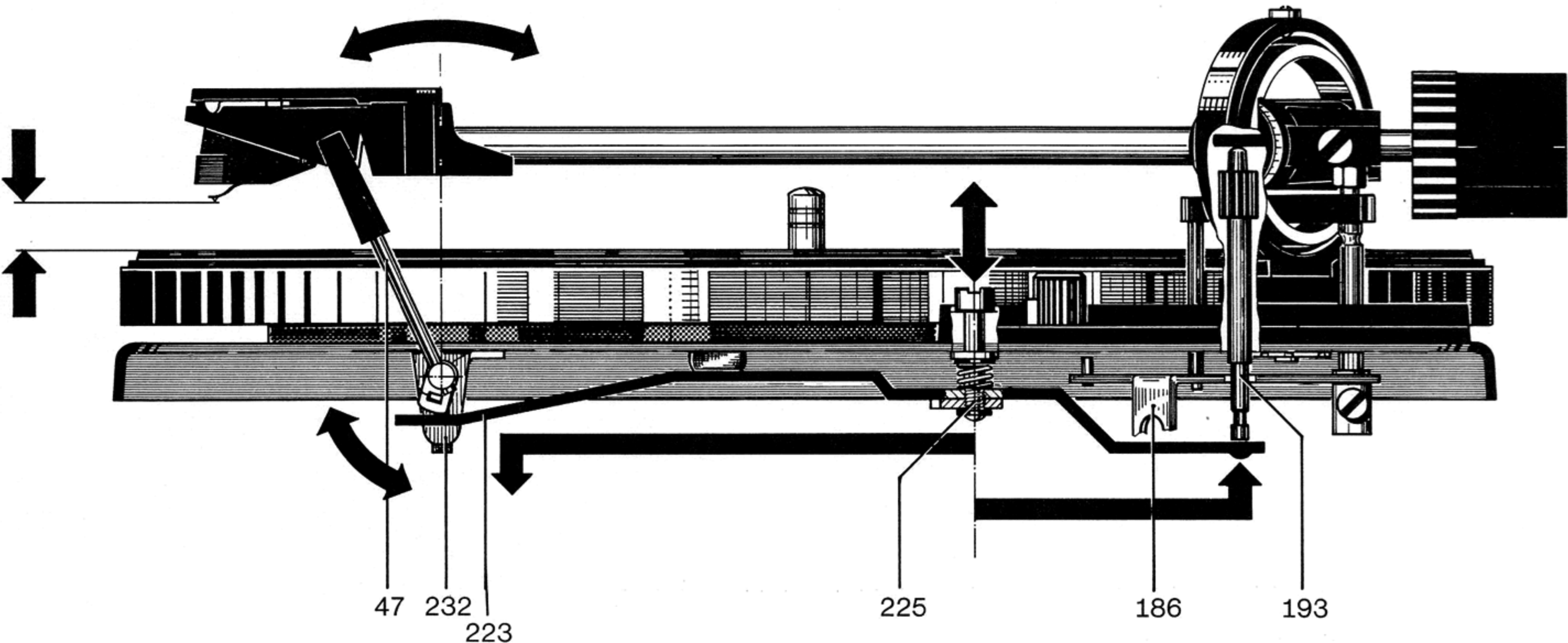
Tonearm lift (Cue control)

The tonearm lift permits the tonearm to be set down on the record safely at any desired point except the shut-off area (near the record label). Pulling the tonearm lift towards the front turns the drive washer (238). This moves the connecting lever (223), and lift screw (193) to raise the tonearm.

After the tonearm is moved (by hand) to the desired spot on the record, the tonearm lift handle is lightly tapped towards the rear to release the mechanism. The connecting lever

(223) and the leaf spring (190) of the lift screw (193) are freed, allowing the tonearm to fall. The rate of fall is controlled by silicone oil in the lift tube. The height of the stylus above the record can be varied by adjusting setscrew (225). Turning it to the right increases the height, turning it to the left decreases the height. In any case, units leaving the factory are adjusted so that the tonearm lifted off the fifth record on the platter.

Fig. 11 Tonearm lift (tonearm raised)



Symptom	Cause	Remedy
Tonearm misses edge of record	a) Set-down incorrectly adjusted	a) Adjust set-down with a 12" record so that stylus touches record approximately 1/16" inside edge of record. Adjustment will be correct for other sizes.
	b) Record not standard size	b) Use standard records
	c) Friction surfaces of tonearm clutch dirty	c) Clean clutch surfaces
Tonearm does not move on to record when drop cycle is started	Damping too great; drive washer dirty	To remove tonearm complete with bearing assembly (described on page 6). Remove pimple (63) on lift bolt (193), remove C-washer (64) and positioning socket, and second C-washer (49). Lift out lift bolt. Clean lift guide tube and lift bolt. Coat lift bolt uniformly with "Wacker Silicon Oil AK 300 000".
Tonearm lowers too quickly when drop cycle is started	Too little damping	To remove tonearm complete with bearing assembly (described on page 6). Remove pimple (63) on lift bolt (193), remove C-washer (64) and positioning socket, and second C-washer (49). Lift out lift bolt. Clean lift guide tube and lift bolt. Coat lift bolt uniformly with "Wacker Silicon Oil AK 300 000".
Tonearm returns to rest immediately after being placed on record manually	Shut-off mechanism has shifted out of position during shipping	Before using changer after moving, run it through start cycle with tonearm locked on rest.

Start cycle

Moving the start switch (45) moves the switch lever (254) towards the main cam (143), initiating the following sequence.

- a) The set screw of the switch lever assembly (254) turns the switch arm (252) mounted on the grooved shaft (257). Via a tension spring, this actuates the rocker assembly (110) and engages the idler (139) between the platter (7) and the motor pulley (117). At the same time, the power switch (163) is actuated by the switch slide (153) through the switch arm, and the turntable begins to rotate.
- b) The switch lever (254) is brought within reach of the cam follower lever (162), so that it is pushed into the change position after the rotation of the main cam.

Moving the operating switch also releases the start lever (256), pulling it towards the main cam by means of the tension spring (255). This causes coil spring to bring the shut-off lever (157) within range of the main cam dog. Thus the shut-off lever drives the main cam.

Fig. 12 Start position

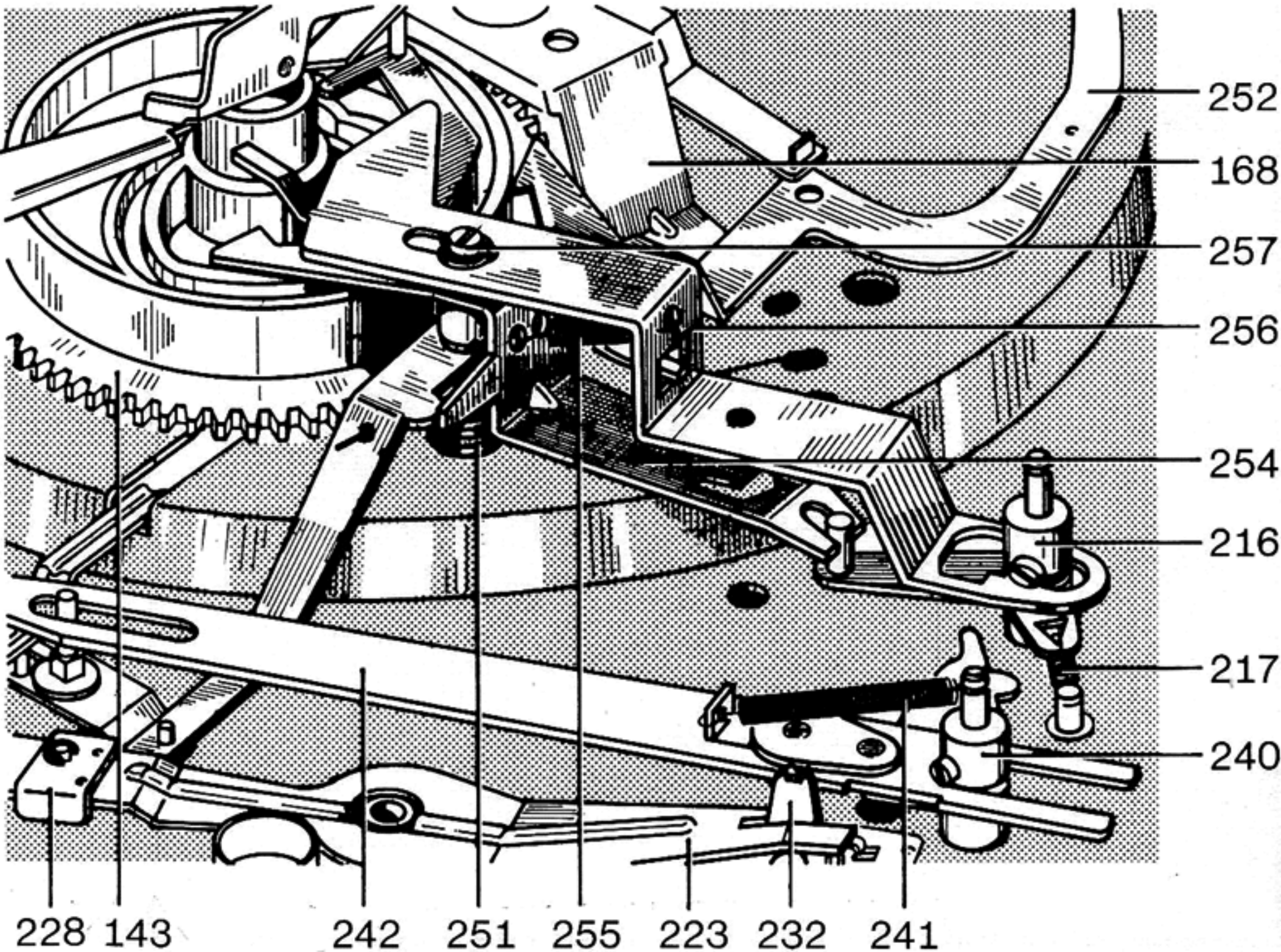
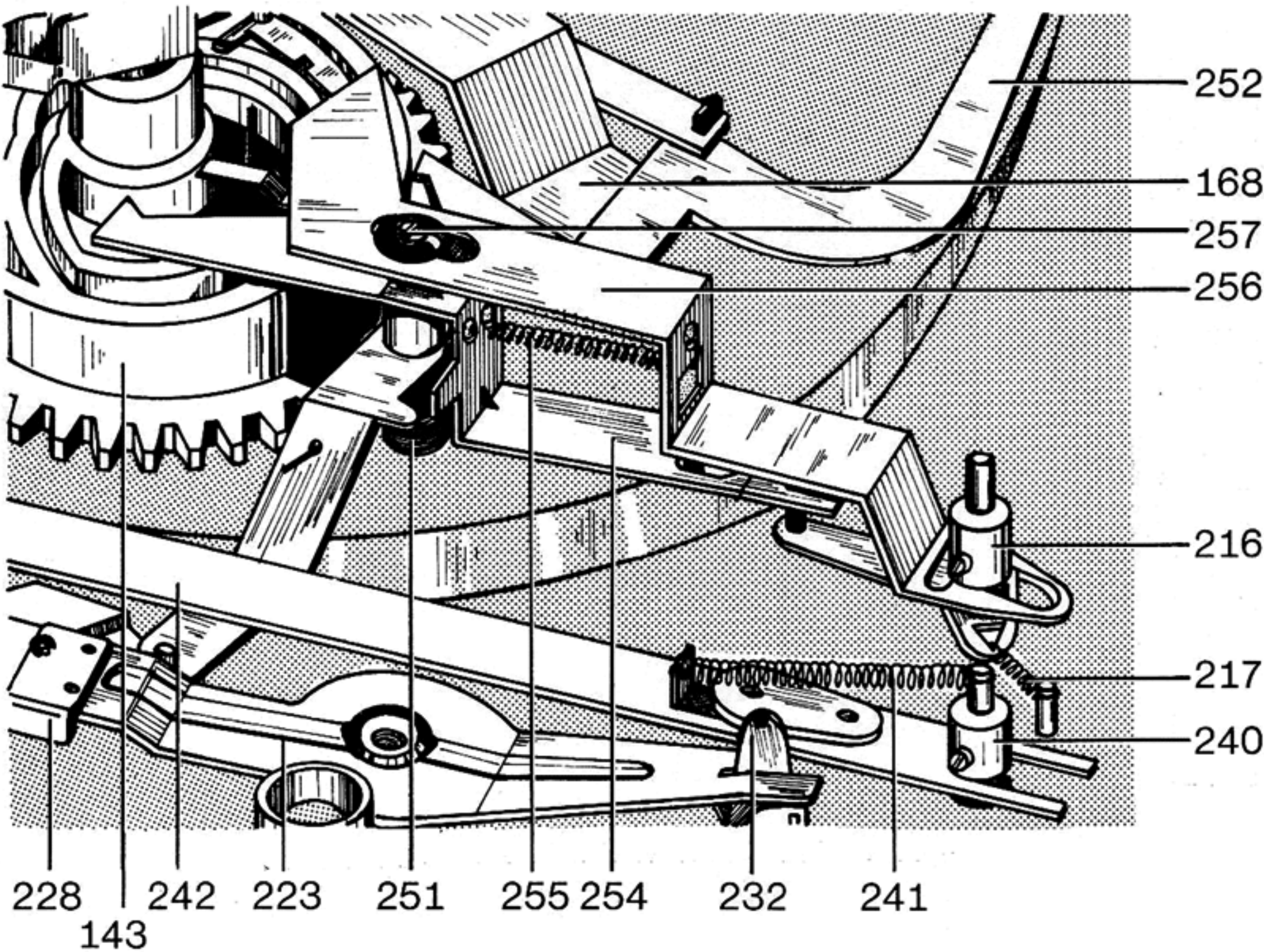


Fig. 13 Stop position



To prevent malfunctioning, the operating switch is locked during the start cycle (that is, while the main cam is turning). Just before the main cam reaches its neutral position (at the end of the change cycle), the start lever is pushed clear of the main cam by the start pin of the main cam. This restores the switch lever and operating switch to their original positions.

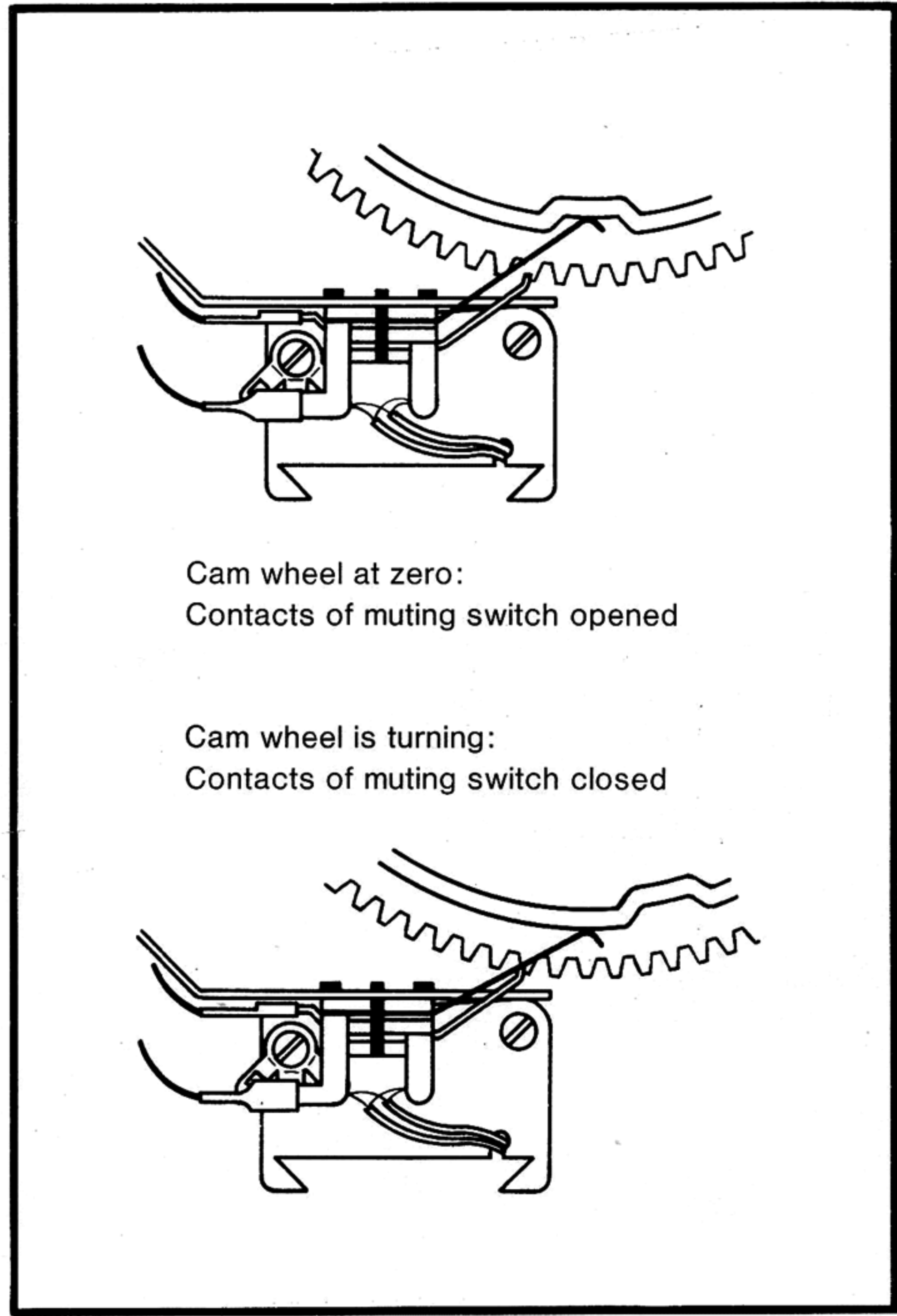
After installation and also after moving the changer, the unit should be started with the tonearm locked on the rest. This will automatically re-adjust the shut-off lever, which may have shifted out of position.

Manual start

When the tonearm (15) is swung inward by hand, the pawl on the switch arm drops into a support on the base plate, holding the switch arm in this position and the idler wheel (139) in contact with the platter. The slide (153) linked with the switch arm actuates the power switch and sets the turntable platter rotating.

On reaching the run-out groove, the tonearm automatically returns to its rest position and the unit shuts itself off. (See shut-off mechanism, next side). However, if the tonearm is lifted off the record manually and returned to the rest, the tabs of the arm segment (186) release the pawl. The torsion spring (251) then re-returns the switch arm to its initial position, opening the power switch and disengaging the idler wheel.

Fig. 14 Muting switch



Stop switching

When the operating lever is moved to "stop", the starting lever (256) is pushed forward. As a result the shut-off linkage comes into contact with the main cam. The swinging lever (162) remains in its stop position.

When the tonearm is on its rest and the operating lever is pushed to "stop", the operating lever must not jam.

Muting switch

To prevent the noises of the change cycle from being sent through the audio system, the apparatus is fitted with a short-circuiting (muting) switch (183). The switch springs for both channels are actuated by the main cam (143). In the tonearm rest position, the muting switch is opened.

Record drop

Insert the appropriate spindle - AW 3 for standard records (7 mm center hole) or AS 12 for 45 rpm records (38 mm center hole).

Record-drop is initiated by the rotation of cam (143), whose cam surface guides the cam rocker (172), pushing the change actuator stud (175) and releasing a record by means of the automatic spindle. The main cam is designed so that a record can drop only when the tonearm is above the tonearm rest and thus out of the reach of the largest possible record (12" diameter).

Fig. 15 Record drop

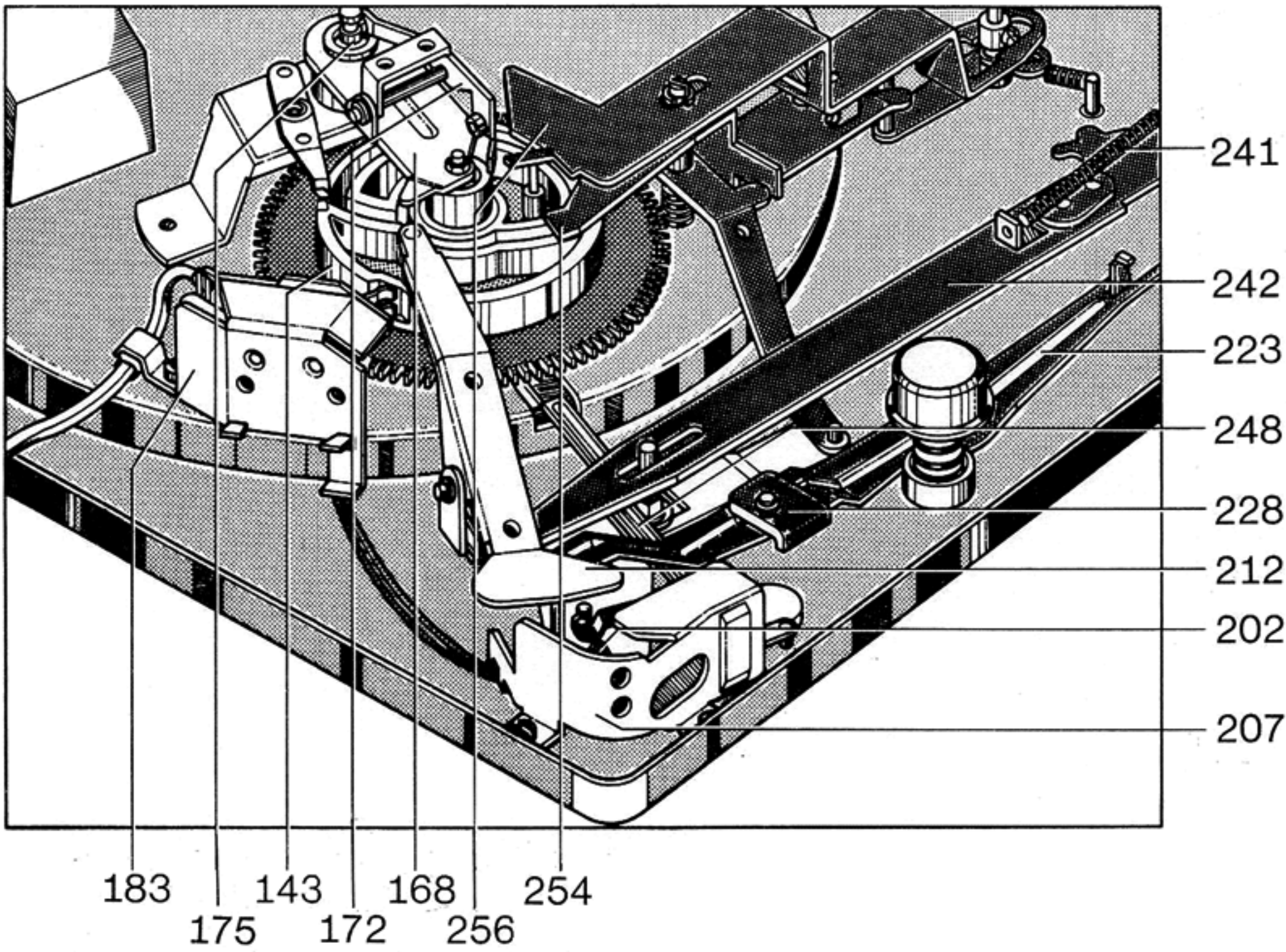


Fig. 16 Actuating "change" or "shut-off"

Shut-off and change cycle

The dog (M) on the turntable platter gear (PR) and the shut-off lever (157) actuate both the change cycle at the end of the record as well as the shut-off after the last record in a stack is played.

At the end of a record, the tonearm moves towards the center at an accelerated rate due to the increased pitch of the grooves. This motion carries the shut-off lever (157) towards the dog by means of the shut-off slide (248). The eccentric dog pushes the shut-off lever (157) back at each revolution as long as the tonearm advance is only one normal record groove.

The run-out groove with its steeper pitch moves the shut-off lever against the dog with greater force, engaging the shut off-lever (157) and causing the main cam (143) to be driven out of its neutral position by the turntable platter gear.

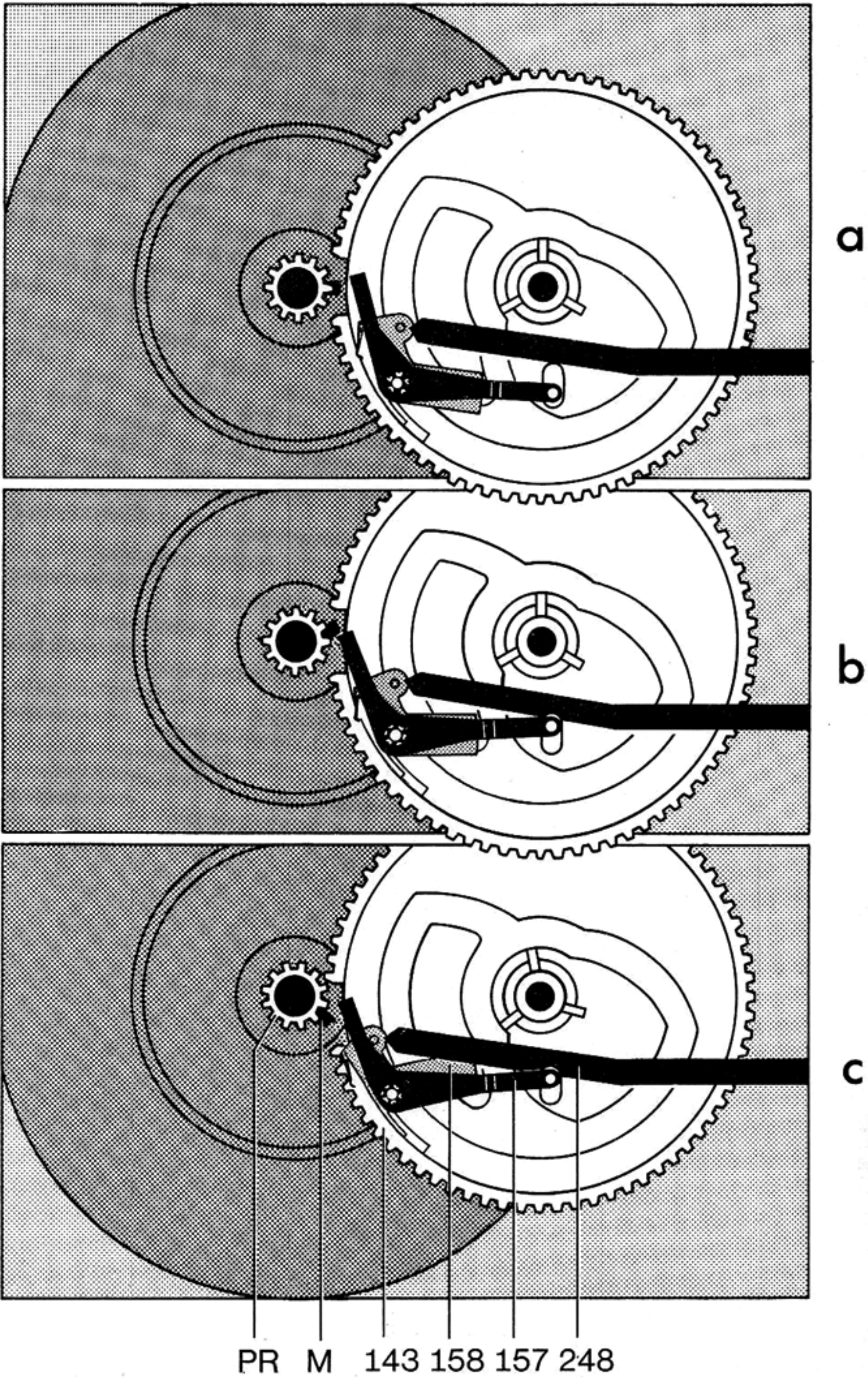
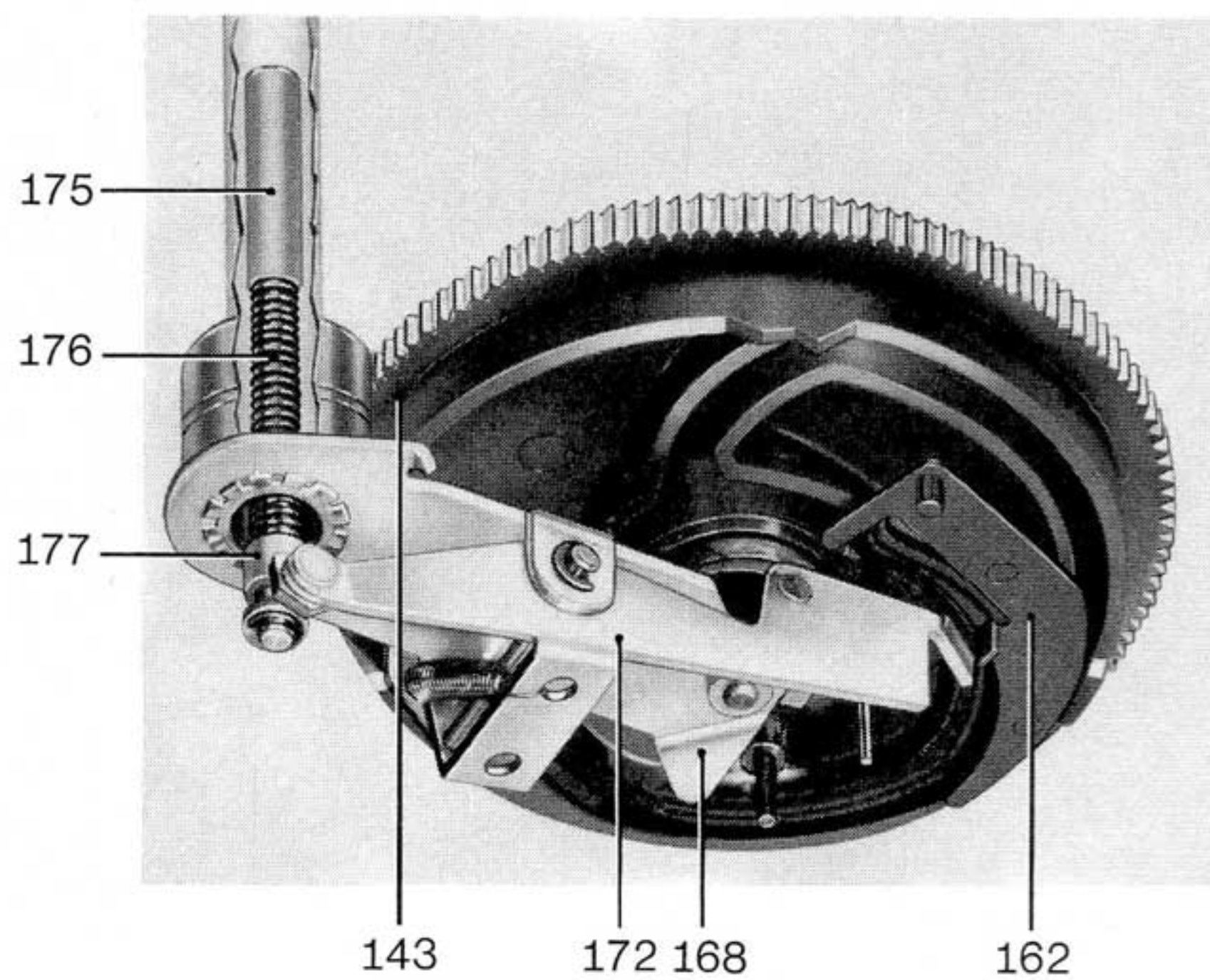


Fig. 17 Change cycle



Shut-off mechanism

Shut-off and change functions are determined by the position of the cam follower lever (162). After every start or record-drop, the cam follower lever is brought to its stop position by the main lever (212) (longer end towards the center of the main cam). As the record is dropped the cam follower lever (162) is turned to its start position by the cam rocker (172), so that the tonearm can swing in toward the record and be lowered on to it. If there are no more records on the spindle, and the cam rocker cannot turn the cam follower lever, the lever remains in its stop position and allows the tonearm to swing to its rest position.

When the main cam (143) returns to its neutral position, the switch arm (252) drops into a cut-out in the main cam, opening the power switch (163) and disengaging the drive idler (139).

Fig. 18

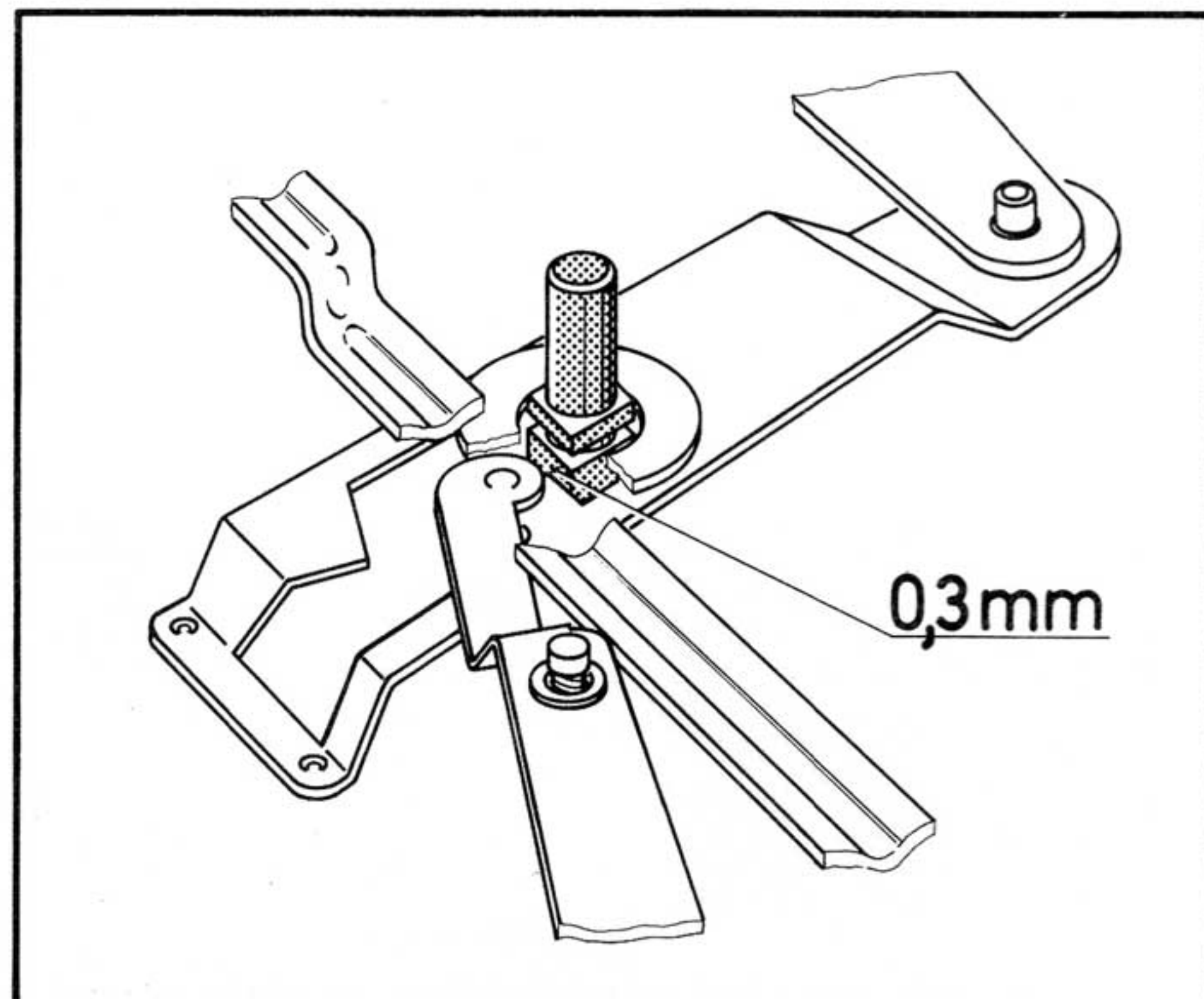
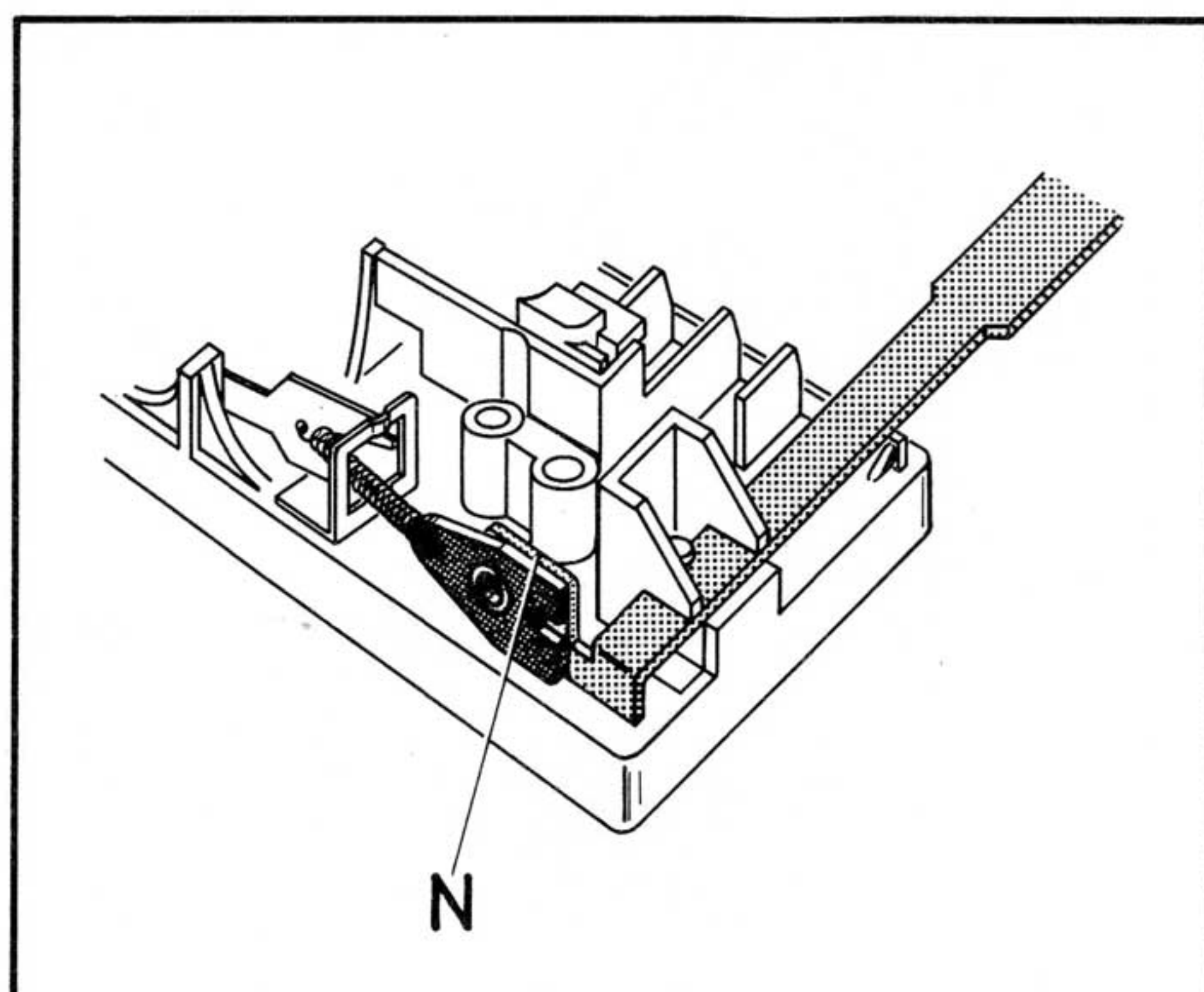


Fig. 19



Symptom

Turntable stops after automatic setdown of the tonearm

Cause

- Switch arm (252) is not latched by pawl (243)
- Power switch opens

Remedy

- Loosen screw and turn the short arm piece on the long switch-arm piece. Move the tonearm in and turn the main cam to its neutral position and adjust for about 1/64" play between cam and rectangular bolts riveted into the chassis.
- As the tonearm moves in, switch slide (153) must overtravel by about 1/64". Its tab must engage the switch.

Symptom

Last record keeps repeating

Cause

Defective spindle

Remedy

Replace spindle

Symptom

Record does not drop when unit is switched to "start"

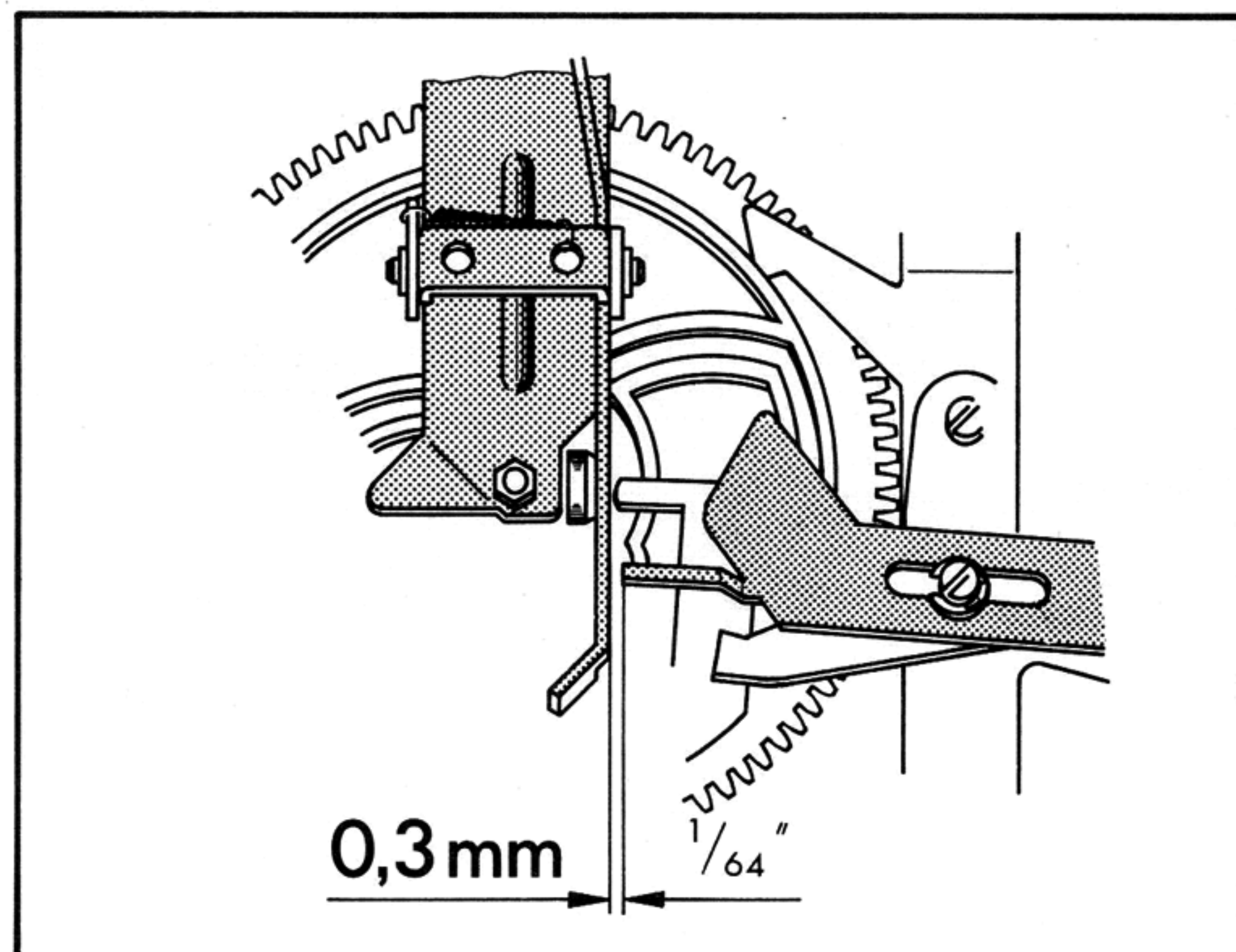
Cause

Inadequate engagement between change lever and cam rocker (172)

Remedy

Adjust clearance between change lever and cam rocker to $\frac{1}{64}$ " minimum with apparatus in "start" position.

Fig. 20



Symptom

Record drops when unit is switched to "stop"

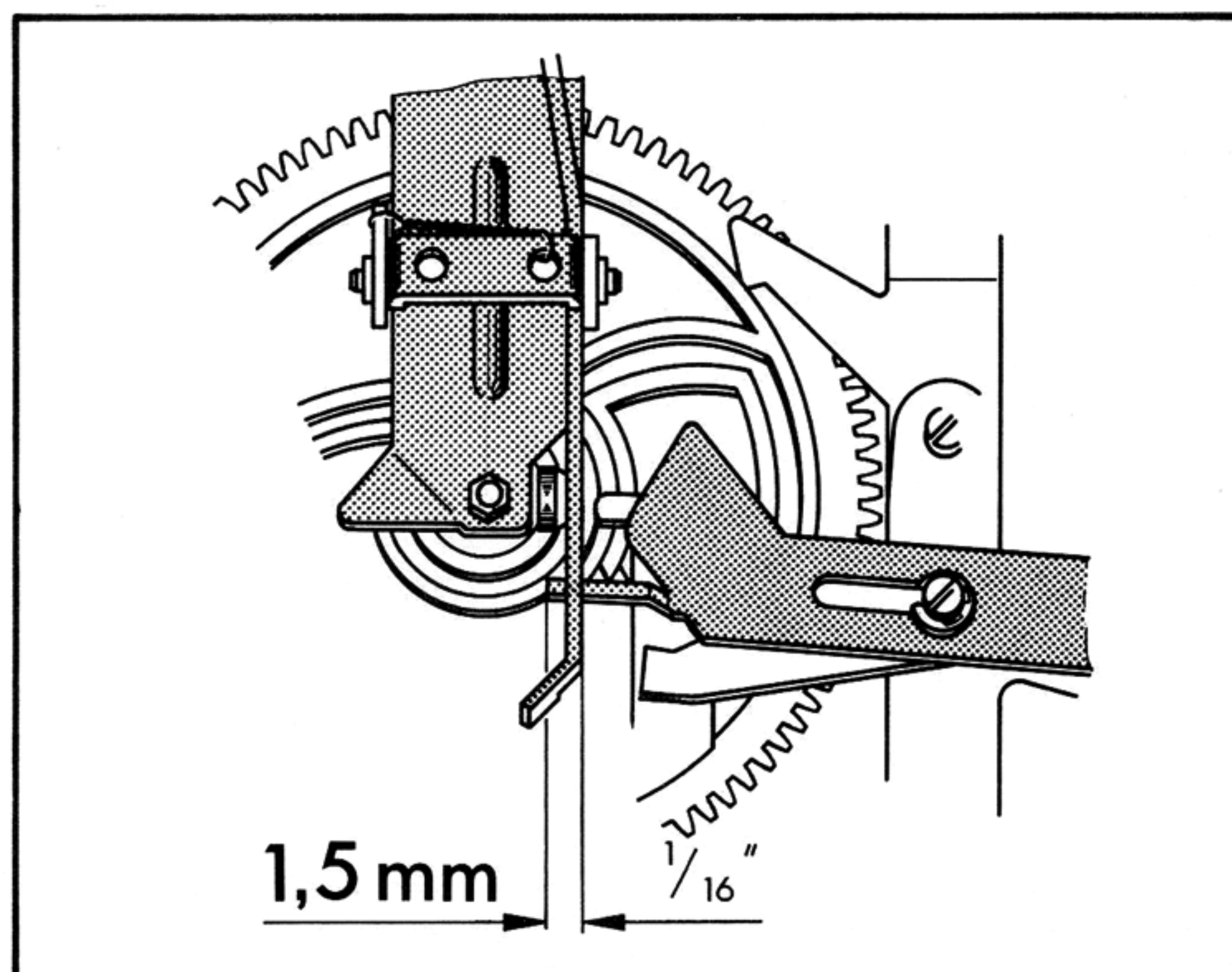
Cause

Cam rocker (172) not caught by start lever

Remedy

Adjust cam rocker so that at the conclusion of the "stop" function the start lever runs about $\frac{1}{16}$ " under the follower.

Fig. 21



Symptom

Records do not drop

Cause

Cam rocker (172) has too little force (travel)

Remedy

Re-adjust eccentric so that when the three supports in the automatic spindle are held in and the main cam is at its neutral, pressing the change screw moves the support about $\frac{1}{64}$ ".

Fig. 22

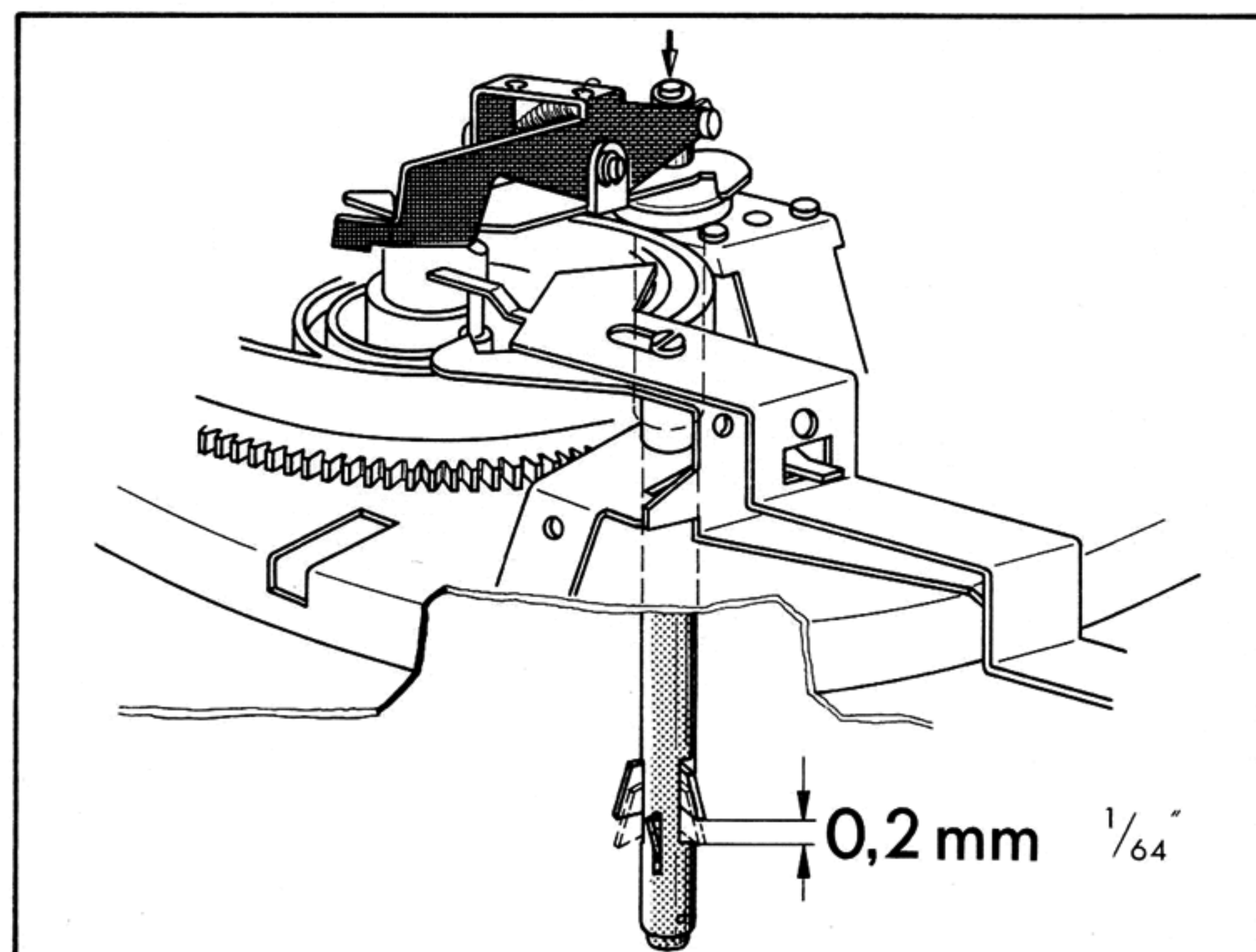
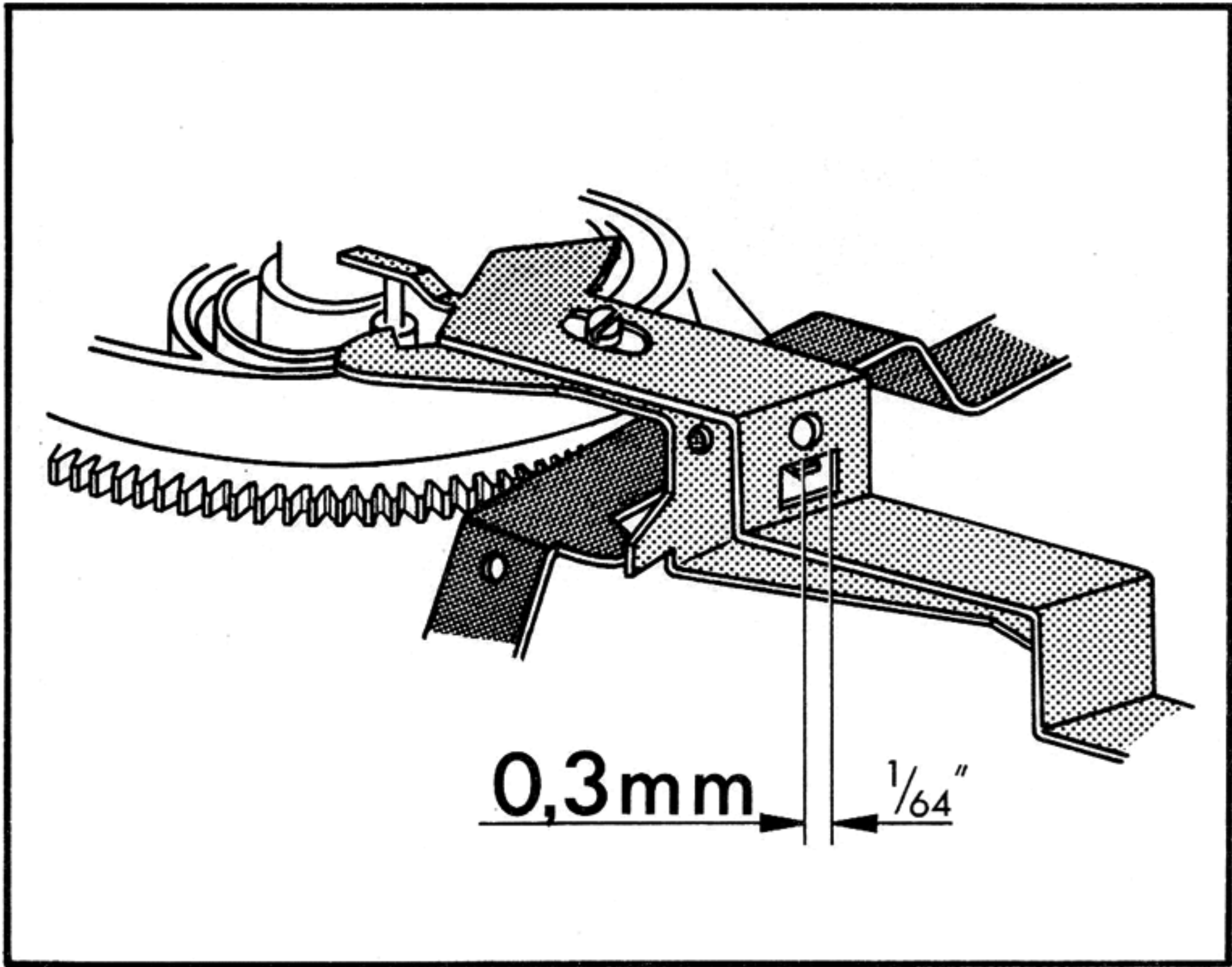


Fig. 23



Symptom

Switch latches into "stop" position when tonearm is at rest.

Cause

Too much clearance between tab on switch arm (252) and start lever (256).

Remedy

Adjust tab on switch arm so that it clears start lever by 1/64" when main cam is in neutral position.

Symptom	Cause	Remedy
Tonearm moves with stylus force and anti-skating force at zero: a) outward; b) inward	a) Anti-skating out of adjustment	a) Adjust skating lever so that horizontal movement of tonearm causes no movement of anti-skating spring.
	b) Too-taut tonearm leads produce a twisting force	b) Allow some slack in tonearm leads
During change, stop and start operations, noises from the mechanism can be heard in system speaker	Muting switch misadjusted. Distance between contact springs and shorting contact is too great	Bend contacts so that, in the neutral position of the main cam the spacing between contacts is about 0,02 inch. Clean contacts.
No sound	Spacing too small	See above
Motor will not shut off when tonearm is on arm rest	Capacitor across power switch is shorted	Replace capacitor (0.1µF, 700 V)
Acoustic feedback	a) Chassis parts (for example leads) are touching base cut-out	a) Correct cut-out according to instructions supplied with unit. Move cables.
	b) Connecting cables are too taut	b) Allow more slack in cables

Symptom

Tonearm is hindered in its horizontal motion during change cycle.

Cause

Positioning socket or positioning screw misadjusted.

Remedy

Move tonearm over operating lever (45) and turn the positioning socket (65) until the clearance between stylus tip and operating lever is approximately 2-3 mm. (Fig. 24).

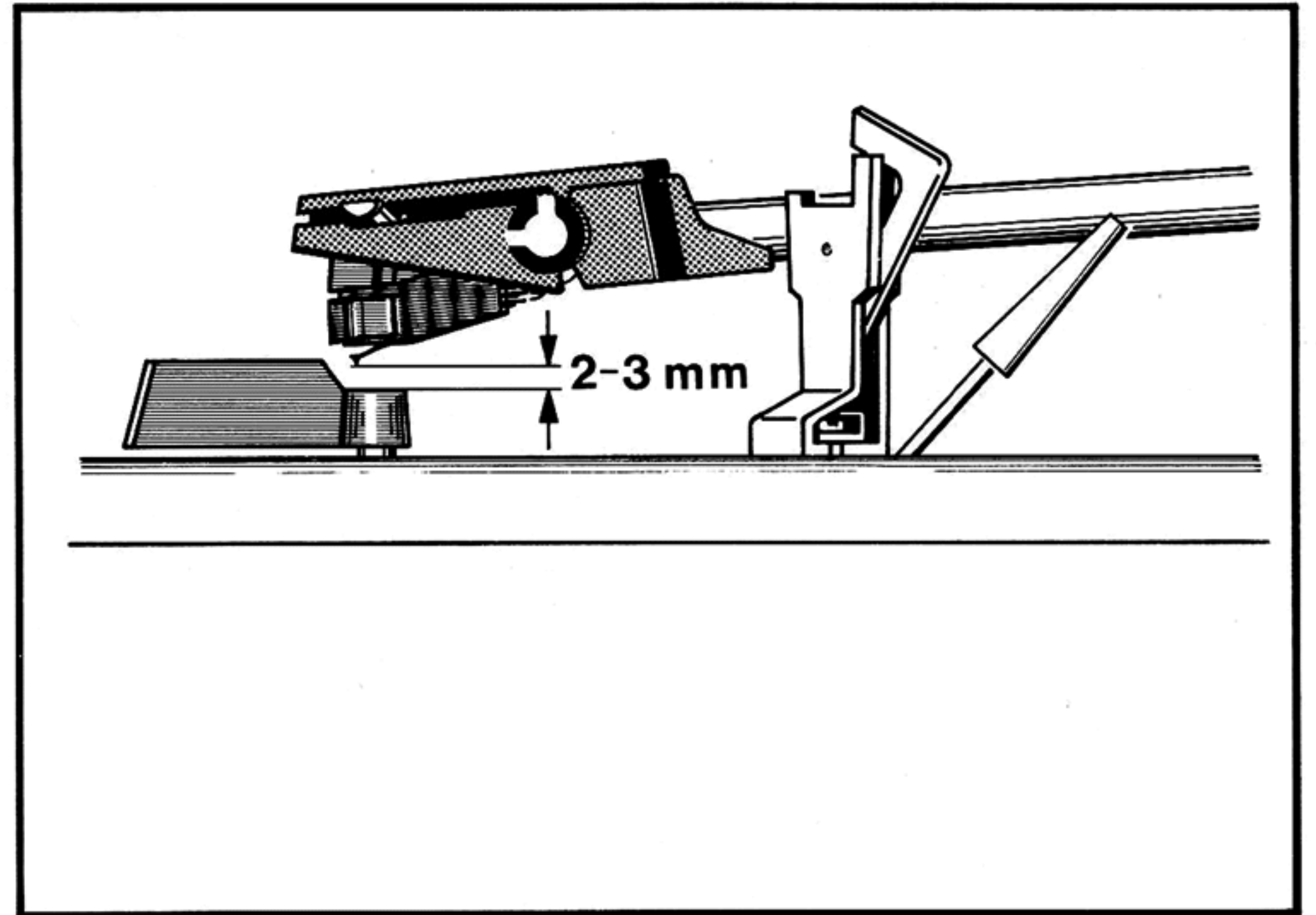
Rotate cam (143) away from its neutral position until main lever (212) lifts the tonearm completely.

Swing the tonearm over its rest and adjust nut (55) so that between pimple (63) and the resting surface of the tonearm there is a play of approximately 0.1 mm. (0.5 mm measured at tonearm head.)

Caution

This play must be maintained over the entire horizontal swing.

Fig. 24



Symptom

Tonearm head is not parallel to turntable platter

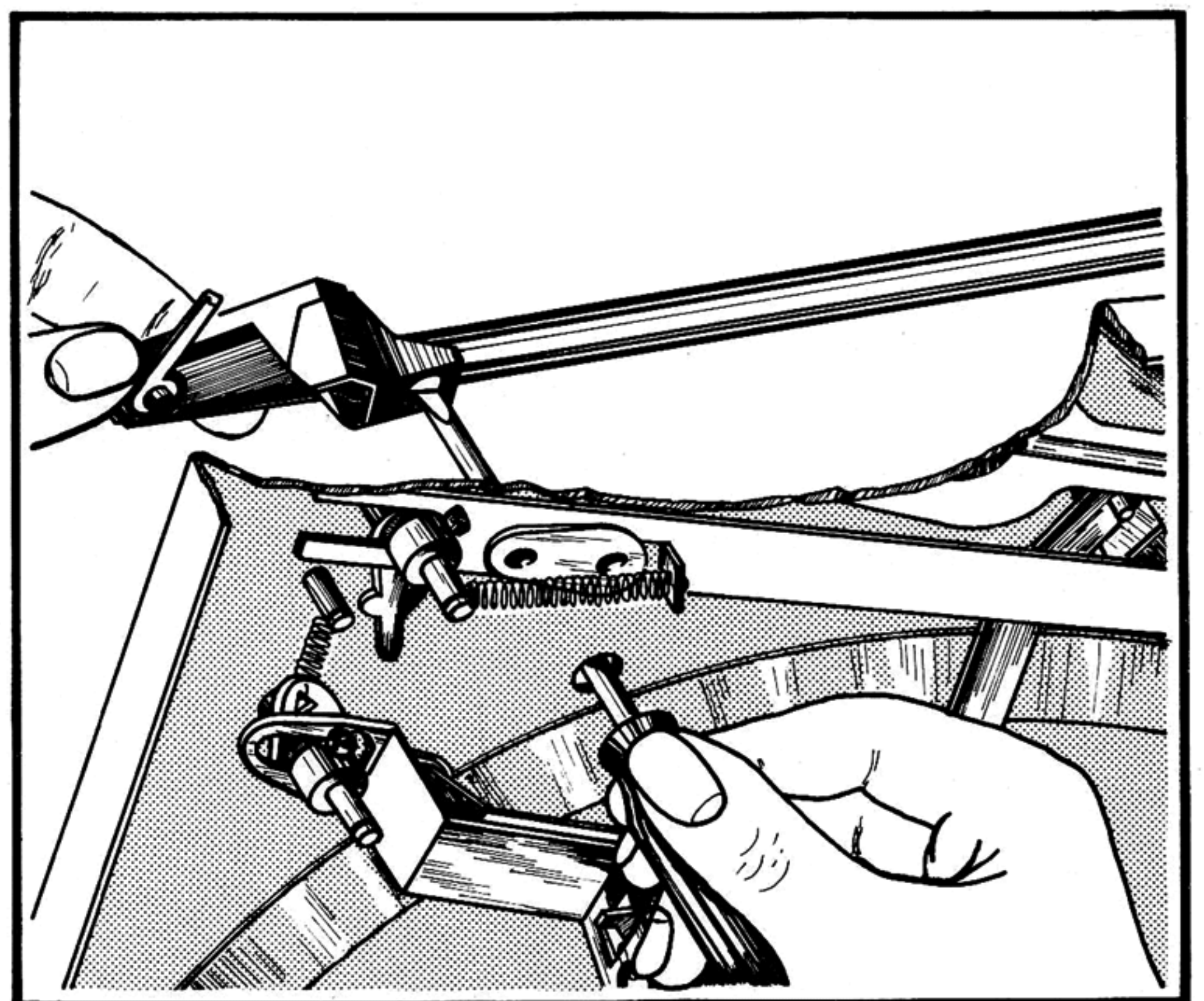
Cause

Orientation of tonearm head on tonearm tube has altered because of jolting in transport (shipping).

Remedy

Remove turntable platter with the help of a screwdriver inserted through the hole in the chassis placed there for the purpose. Loosen screw on tonearm head. After correcting the tonearm head, tighten screw. (Fig. 25)

Fig. 25



Replacement parts

Ref. No.	Part. No.	Description	Quantity	
1	215 470	Automatic spindle AS 12	1	
2	213 895	Changing spindle AW 3	1	
3	214 056	Washer	1	
4	200 543	Retaining ring	1	
5	201 208	Facing ring 230 mm Ø	1	
6	218 385	Turntable mat complete, with facing ring 230 mm Ø	1	
7	218 388	Turntable complete, with mat and facing ring 230 mm Ø	1	
8	221 725	Speed change lever, left, complete	1	
9	217 241	Pitch control knob complete	1	
10	223 047	Blind (cm)	1	
	223 048	Blind (inch)	1	
11	223 045	Chassis complete	1	
12	214 210	Shipping screw assembly	2	
13	220 213	Centering disc	1	
14	201 101	Centering pin	1	
15		Tonearm assembly (only available complete as pos. no. 16, 42-43 and 50-60)		
16	223 055	Tonearm complete	1	
17	223 046	Tonearm head complete	1	
18	201 132	Lift	1	
19	210 182	Bowed lockwasher	1	
20	210 630	Washer 4.2/8/0.5 St	1	
21	210 197	Grip ring G 4 x 0.8	1	
22	223 036	Cartridge mount TK 15	1	
23	223 011	Tonearm rest complete	1	
24	210 362	Hex nut BM 3	2	
25	210 816	Machine screw M 4 x 4	1	
26	217 374	Centering screw	1	
27	210 366	Hex nut BM 4	9	
28	210 362	Hex nut BM 3	2	
29	200 579	Spring mounted footing complete (1 set = 3 pieces)	1	
30	200 721	Bushing isolation mount	3	
31	200 728	Compression spring isolation mount	3	
32	200 723	Rubber insert isolation mount	3	
33	200 722	Steel cup	3	
34	210 366	Hex nut BM 4	9	
35	201 632	Rubber washer	2	
36	200 713	Washer	2	
37	200 712	Spring cup	2	
38	200 711	Lockwasher	2	
	210 366	Hex nut BM 4	4	
39	210 624	Washer 4.2/7/0.3 St	4	
40	200 718	Compression spring	2	
41	210 624	Washer 4.2/7/0.3 St	4	
42	216 831	Stop nut	1	
43	216 830	Threaded rod, short	1	
44	214 217	Contact plate complete	1	
45	221 726	Switch lever, right, complete	2	
46	221 726	Switch lever, right, complete	2	
47	216 881	Arm lift lever, complete	1	
48	210 353	Hex nut BM 2	1	
49	210 143	"C" washer 1.5	3	
50	223 054	Weight complete	1	
51	221 581	Spindle for weight	1	
52	216 545	Securing screw	1	
53	218 297	Spring barrel complete	1	
54	223 044	Bearing ring complete	1	
55	221 558	Stop nut	1	
56	216 829	Bearing screw	1	
57	216 834	Locknut, high	1	
58	221 486	Threaded rod, long	1	
59	223 043	Ring complete	1	
60	210 187	Bowed lockwasher	2	
61	210 658	Washer 5.1/10/1	2	
62	210 147	"C" washer 4.0	4	
63	216 844	Shaft pin	2	
64	210 143	"C" washer 1.5	3	
65	218 318	Set housing	1	
66	220 898	Knob	1	
67	223 052	Dress plate complete	1	
68	213 260	Pin 2 x 6	4	
69	217 905	Damping piece	1	
70	214 047	Special screw (pierced)	2	
	214 211	Special screw (threaded)	2	

Fig. 26 Exploded view, parts below chassis

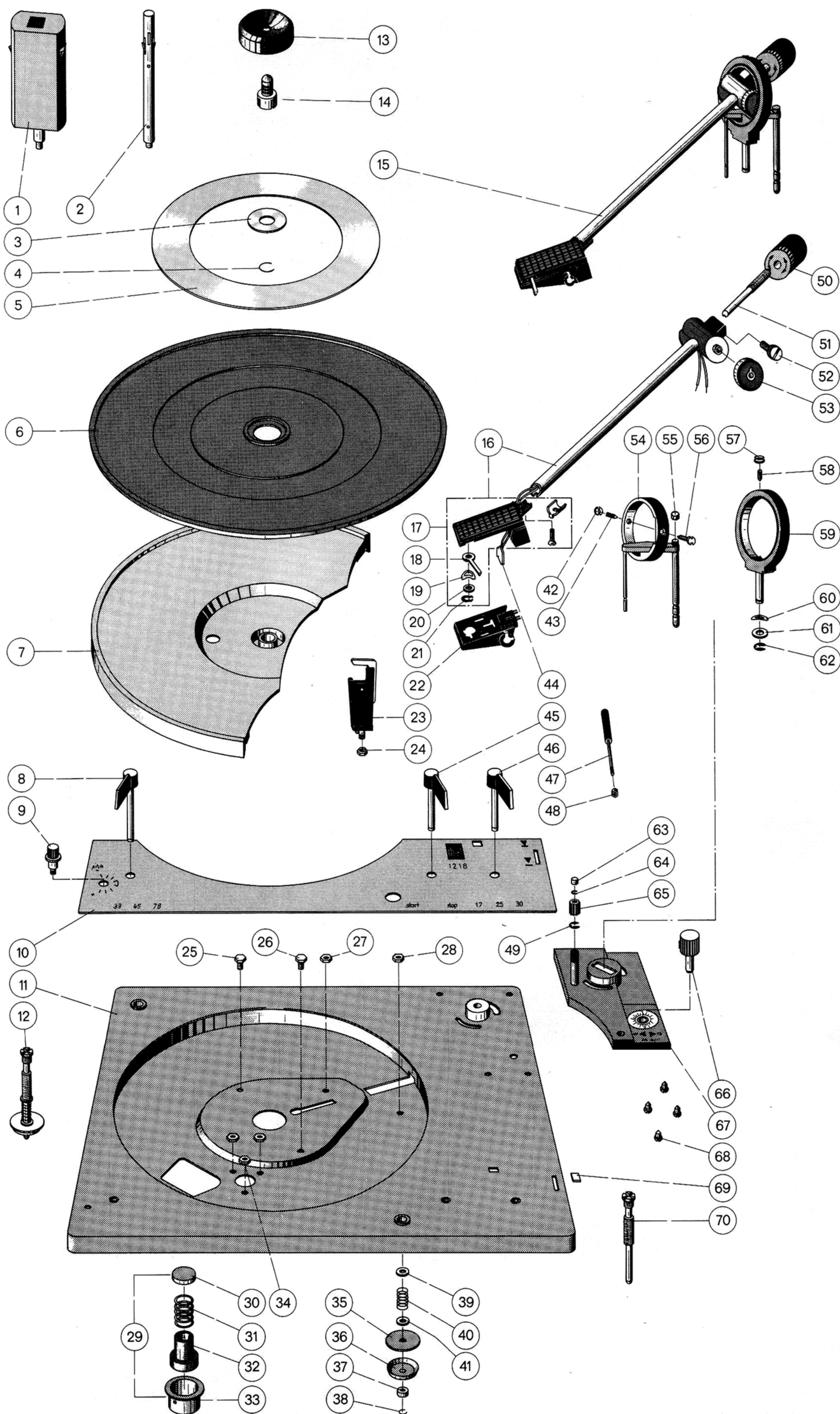
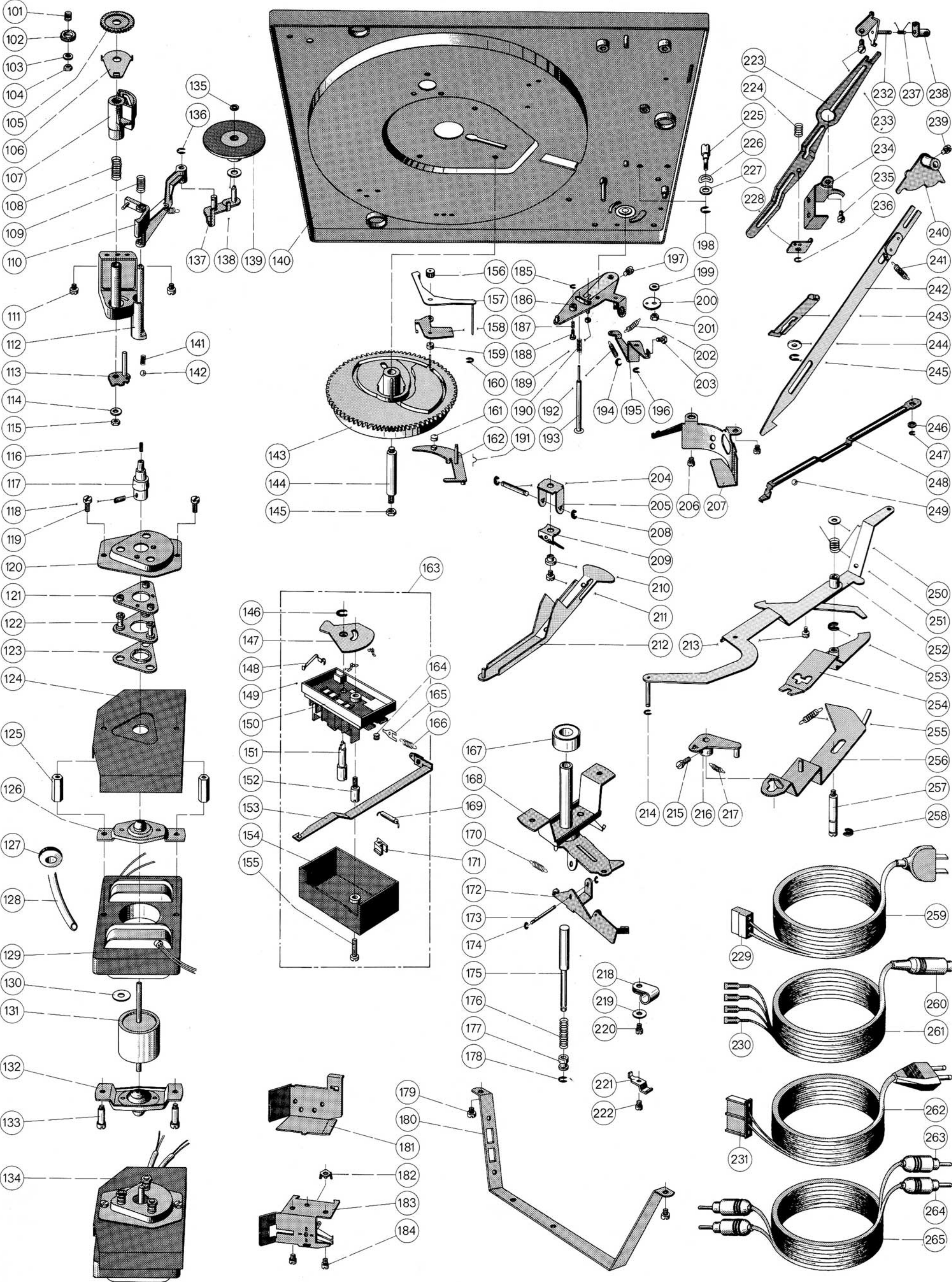


Fig. 27 Exploded view, parts above chassis



Ref. No.	Part. No.	Description	Quantity	
101	217 376	Compression spring	1	
102	217 026	Cam wheel	1	
103	210 586	Washer 3.2/7/0.5 St	3	
104	210 361	Hex nut M 3	3	
105	217 027	Speed regulator wheel	1	
106	217 233	Speed regulator detent	1	
107	217 028	Switching segment	1	
108	216 736	Compression spring	1	
109	216 737	Compression spring	1	
110	217 234	Idler arm complete	1	
111	210 475	Machine screw AM 3 x 5	10	
112	216 558	Support complete	1	
113	217 239	Groove detent complete	1	
114	210 642	Washer 4.2/10/1.5 St	4	
115	210 361	Hex nut M 3	3	
116	217 751	Threaded pin M 2.6 x 8	1	
117	218 273	Motor pulley 50 Hz complete	1	
	218 274	Motor pulley 60 Hz complete	1	
118	210 220	Threaded pin M 2.6 x 3.5	1	
119	210 509	Machine screw AM 3.5 x 8	2	
120	204 669	Dress-up plate	1	
121	204 668	Isolation mount plate	1	
122	222 306	Mounting bracket complete	1	
123	222 283	Isolation washer lower	1	
124	204 665	Motor shield	1	
125	200 167	Motor spacer	2	
126	215 843	Motor bearing top complete	1	
127	209 939	Sleeving	1	
128	217 727	Insulating sleeve	1	
129	218 386	Stator 110/220 V complete	1	
	220 184	Stator 150 V complete	1	
130	215 839	Protecting washer	1	
131	218 389	Rotor complete	1	
132	215 840	Motor bearing lower complete	1	
133	215 848	Screw bolt	2	
134	223 049	Motor 110/220 V complete	1	
	223 050	Motor 150 V complete	1	
135	200 633	Lockwasher	1	
136	210 146	"C" washer 3.2	3	
137	217 244	Idler arm complete	1	
138	200 110	Washer	1	
139	217 888	Idler wheel complete	1	
140	223 045	Chassis complete	1	
141	218 629	Compression spring	1	
142	209 358	Steel ball 4 mm Ø	2	
143	220 332	Cam wheel complete	1	
144	200 519	Bearing post for cam wheel	1	
145	210 366	Hex nut BM 4	9	
146	210 196	"C" clip G 3 x 0.6	1	
147	214 174	Contact support	1	
148	214 176	Screen spring	1	
149	214 175	Contact spring	2	
150	217 060	Switch plate complete with voltage selector	1	
	214 206	Switch plate complete less voltage selector	1	
	223 006	Switch plate complete with SEMKO capacitor and voltage selector	1	
151	214 173	Speed spindle	1	
152	214 181	Screw bolt	1	
153	213 970	Switch slide complete	1	
154	217 062	Switch cover with voltage selector	1	
	214 207	Switch cover less voltage selector	1	
	223 007	Switch cover with voltage selector and SEMKO capacitor	1	
155	210 492	Machine screw AM 3 x 15	1	
156	220 235	Stop nut	1	
157	220 232	Shut-off lever complete	1	
158	222 690	Friction plate complete	1	
159	221 935	Bushing	1	
160	210 145	"C" washer 2.3	9	
161	200 650	Sleeve	1	
162	214 203	Cam follower lever complete with sleeve	1	
163	217 059	Power switch complete with voltage selector	1	
	214 205	Power switch complete less voltage selector	1	
	222 997	Power switch complete with voltage selector and SEMKO capacitor	1	

Ref. No.	Part. No.	Description	Quantity	
164	218 986	Roller for switch slide	1	
165	213 966	Snap spring	1	
166	213 968	Tension spring	1	
167	200 554	Ball bearing complete	1	
168	214 201	Bearing support complete	1	
169	203 725	Capacitor	1	
	221 186	SEMKO capacitor	1	
170	213 925	Tension spring	1	
171	213 978	Locking device, small, for power switch housing	1	
	213 979	Locking device, large, for power switch housing	1	
172	213 922	Cam rocker complete	1	
173	217 813	Spindle	1	
174	210 145	"C" washer 2.3	9	
175	213 918	Change actuator	1	
176	213 920	Compression spring	1	
177	213 921	Bushing	1	
178	210 145	"C" washer 2.3	9	
179	210 475	Machine screw AM 3 x 5	10	
180	217 617	Stand	1	
	217 759	Stand complete with phono jacks	1	
181	201 240	Shield	1	
182	211 614	Solder lug	1	
183	207 447	Muting switch complete	1	
184	210 475	Machine screw AM 3 x 5	10	
185	210 143	"C" washer 1.5	3	
186	223 041	Segment complete	1	
187	201 174	Tension spring	1	
188	200 686	Spring pin	1	
189	216 844	Pin	2	
190	216 853	Tension spring	1	
191	200 522	Snap spring	1	
192	218 591	Tension spring	1	
193	221 571	Lift rod complete	1	
194	201 184	Set washer	1	
195	222 691	Skating lever complete	1	
196	210 146	"C" washer 3.2	3	
197	210 469	Machine screw AM 3 x 3	3	
198	210 147	"C" washer 4.0	4	
199	216 867	Bowed lockwasher	1	
200	220 899	Cam washer	1	
201	210 361	Hex nut M 3	3	
202	217 948	Tension spring	1	
203	221 260	Set screw	1	
204	200 528	Spindle	1	
205	201 185	Main lever bracket	1	
206	210 475	Machine screw AM 3 x 5	10	
207	217 285	Cover plate	1	
208	210 145	"C" washer 2.3	9	
209	201 186	Leaf spring	1	
210	200 458	Spacer	1	
211	210 480	Machine screw AM 3 x 6	1	
212	201 094	Main lever complete	1	
213	210 475	Machine screw AM 3 x 5	10	
214	210 245	"C" washer 2.3	9	
215	218 583	Machine screw M 3 x 4	2	
216	216 773	Selector lever complete	1	
217	216 777	Tension spring	1	
218	220 152	Plastic clamp	1	
219	210 586	Washer 3.2/7/0.5	3	
220	210 475	Machine screw AM 3 x 5	10	
221	200 447	Cable clamp	1	
222	210 475	Machine screw AM 3 x 5	10	
223	221 576	Connecting lever	1	
224	221 577	Tension spring	1	
225	221 559	Set screw	1	
226	210 187	Bowed lockwasher	2	
227	210 658	Washer 5.1/10/1 St	2	
228	221 578	Guide piece	1	
229	209 457	Inner casing for AMP plug	1	
230	209 436	Flat prong plug	4	
231	213 980	Input jack housing	1	
232	221 574	Connecting lever bracket complete	1	
233	210 469	Machine screw AM 3 x 3	3	

Ref. No.	Part. No.	Description	Quan- tity	
234	221 623	Stopper	1	
235	210 511	Machine screw AM 4 x 4	1	
236	210 145	"C" washer 2.3	9	
237	217 296	Torsion spring	1	
238	220 790	Drive cam	1	
239	218 583	Machine screw M 3 x 4	2	
240	217 264	Selector lever complete	1	
241	200 453	Tension spring	1	
242	217 276	Arm positioning slide complete	1	
243	213 942	Latch complete	1	
244	202 043	Washer 5.8/12/0.5 St	2	
245	210 146	"C" washer 3.2	3	
246	201 187	Friction disc	1	
247	210 145	"C" washer 2.3	9	
248	200 688	Shut-off lever	1	
249	209 358	Steel ball 4 mm Ø	2	
250	210 586	Washer 3.2/7/0.5 St	3	
251	213 940	Torsion spring	1	
252	217 889	Switch arm complete	1	
253	210 147	"C" washer 4.0	4	
254	218 538	Switch lever complete	1	
255	200 103	Torsion spring	1	
256	217 258	Start lever complete	1	
257	217 334	Grooved shaft	1	
258	210 147	"C" washer 4.0	4	
259	213 984	Power cord with ground connection (U.S. type plug)	1	
260	209 424	Miniatur plug (U. S. type plug) for audio cable	1	
261	207 303	Audio cable complete with miniatur plugs (U.S. type plug)	1	
262	220 142	Power cord complete	1	
263	209 425	Phono plug (RCA type plug) yellow	2	
264	209 426	Phono plug (RCA type plug) red	2	
265	207 299	Audio cable, complete, with phono plugs (RCA type plugs)	1	
**	201 229	Cover pin	1	
**	214 210	Hardware for cartridge mounting	1	
**	211 473	Stroboscope disc 50/60 Hz	1	
**	214 219	Packing carton, complete	1	
**	222 332	Operating instructions in 4 languages		
**	222 660	Operating instructions UAP		
**	222 685	Operating instructions english		
**	222 330	Mounting instructions		

Alteration reserved
 ** Not illustrated

Lubrication

All bearings and sliding points have been properly lubricated during assembly. Re-lubrication is normally not necessary for about two years since all important bearings are provided with oil retainers and sintered bearings.

Lubrication should be applied sparingly. It is of primary importance that no oil or grease should get onto the friction surfaces of the drive wheel, motor pulley or turntable, to avoid slippage. For the same reason, avoid touching these parts.

Use the following lubricants:

- 1

Wacker siliconoil
AK 300 000
- 2

Adhesive oil,
Renotac No. 342
- 3

BP oil, Super Viskostatic
10 W/ 30
- 4

Shell Alvania No. 2
- 5

Isoflex PDP 40

Fig. 28 Chassis, viewed from above

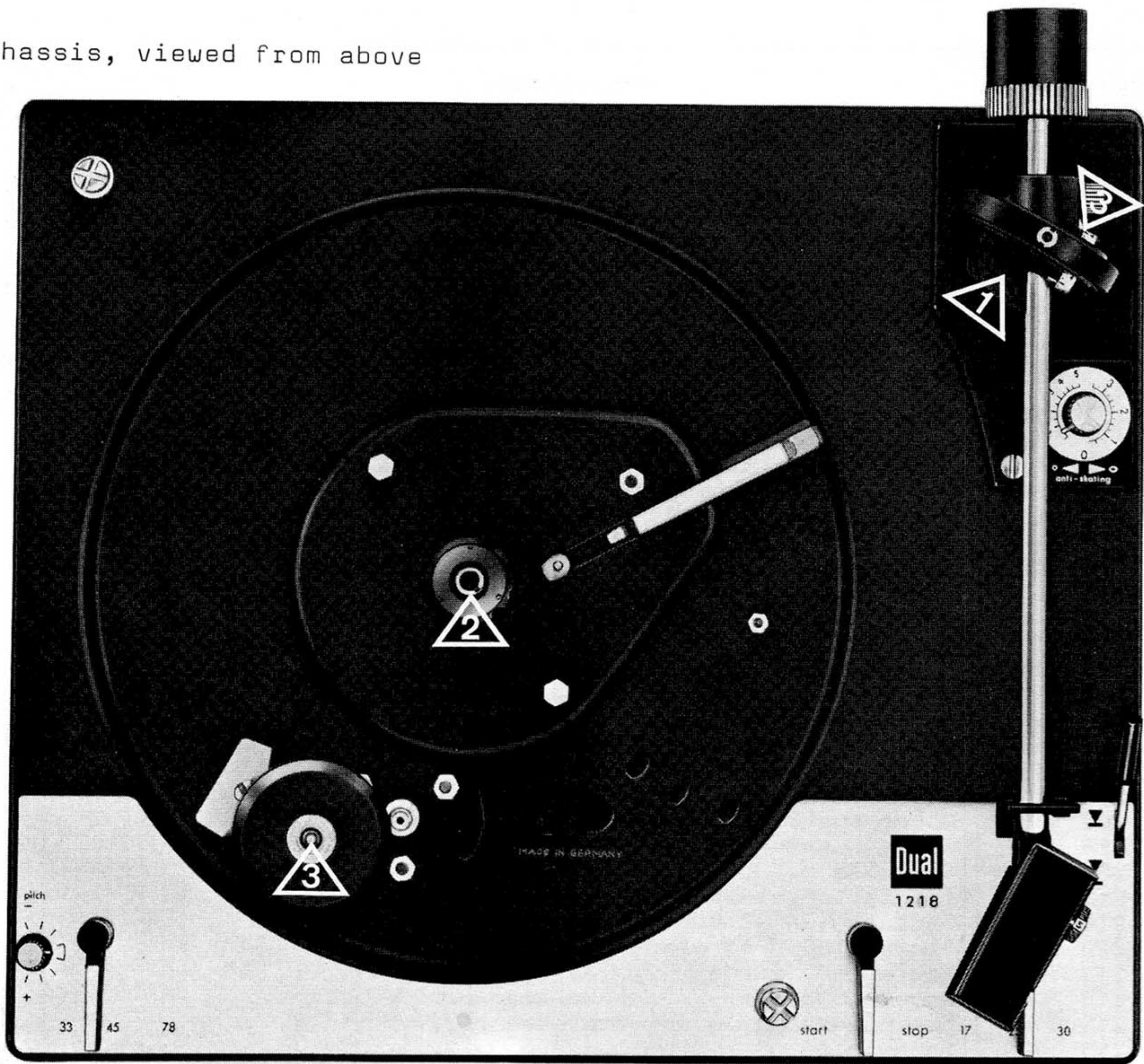


Fig. 29 Chassis, viewed from below

